Evaluation of Used Fuel Disposition in Clay-Bearing Rock (Vol. II): Appendices A, B, C for Part III

(FCRD-UFD-2015-000124)

Fuel Cycle Research & Development

Prepared for
U.S. Department of Energy
Used Fuel Disposition Campaign

Carlos F. Jové Colón (SNL)

Florie A. Caporuscio, Michael Cheshire, Sarah Palaich, Katherine Norskog (LANL)

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Prepared by:

Sandia National Laboratories

Albuquerque, New Mexico 87185

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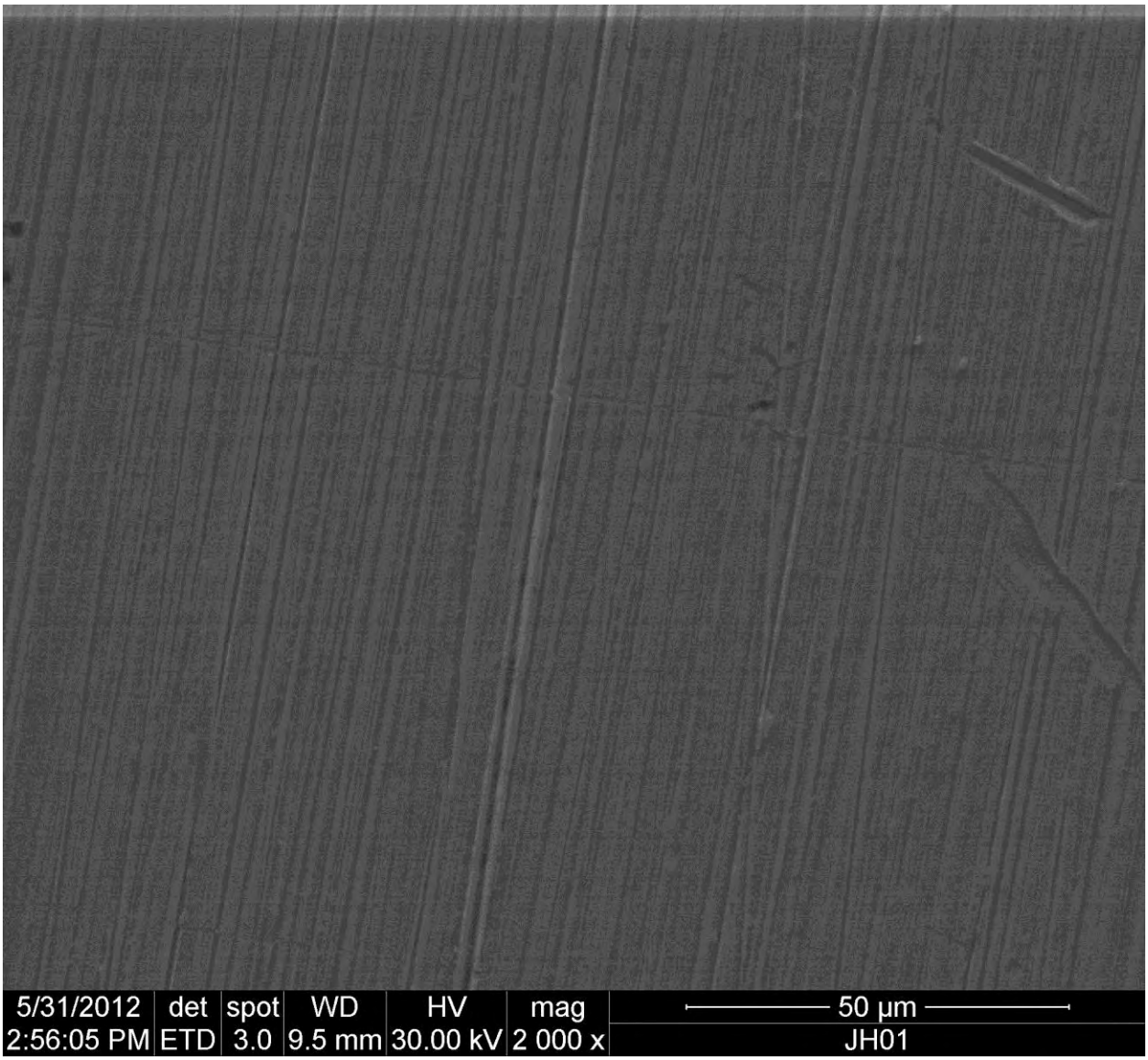
Appendix A

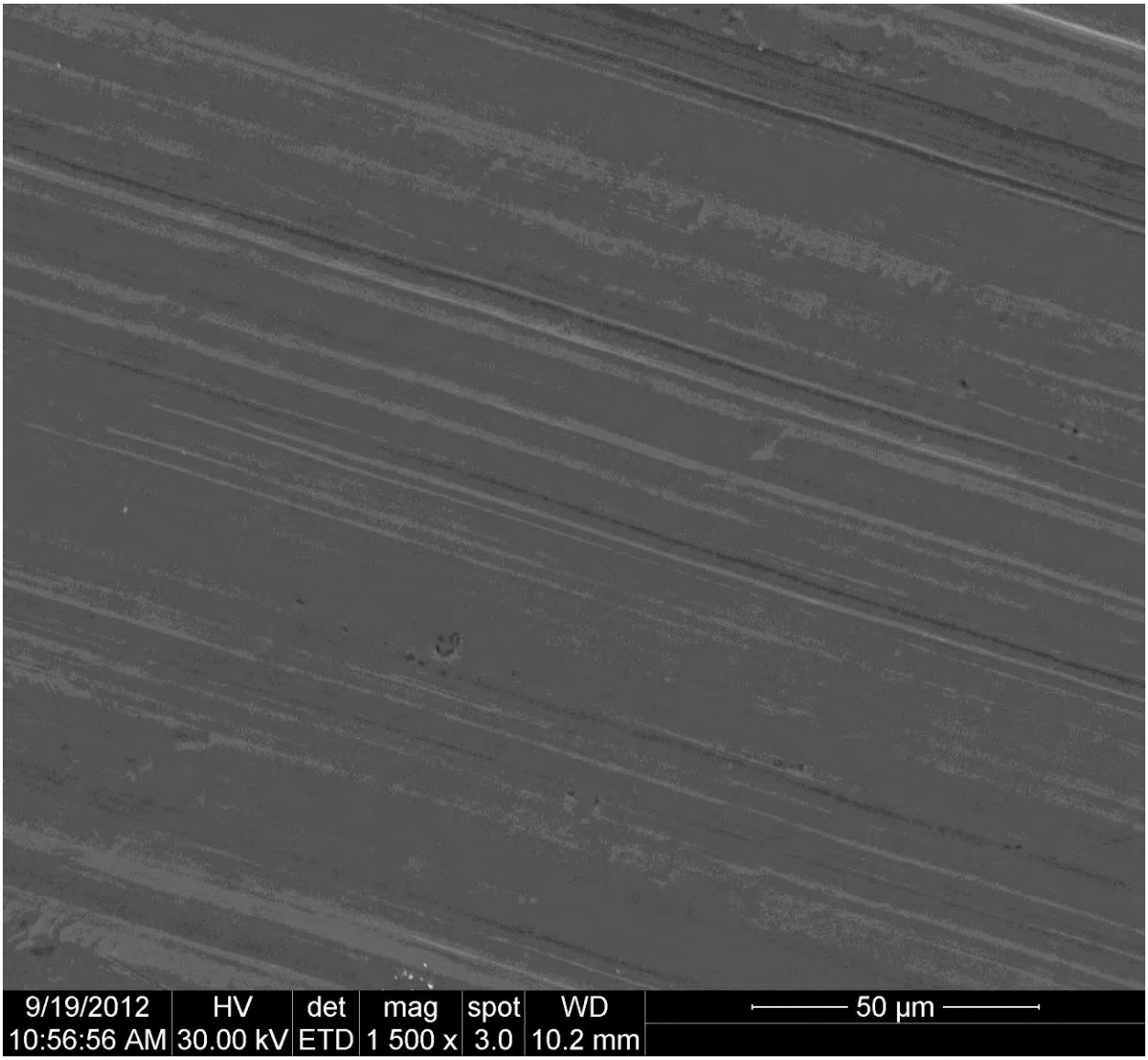
SEM and Probe Images from EBS experiments

Appendix A.0

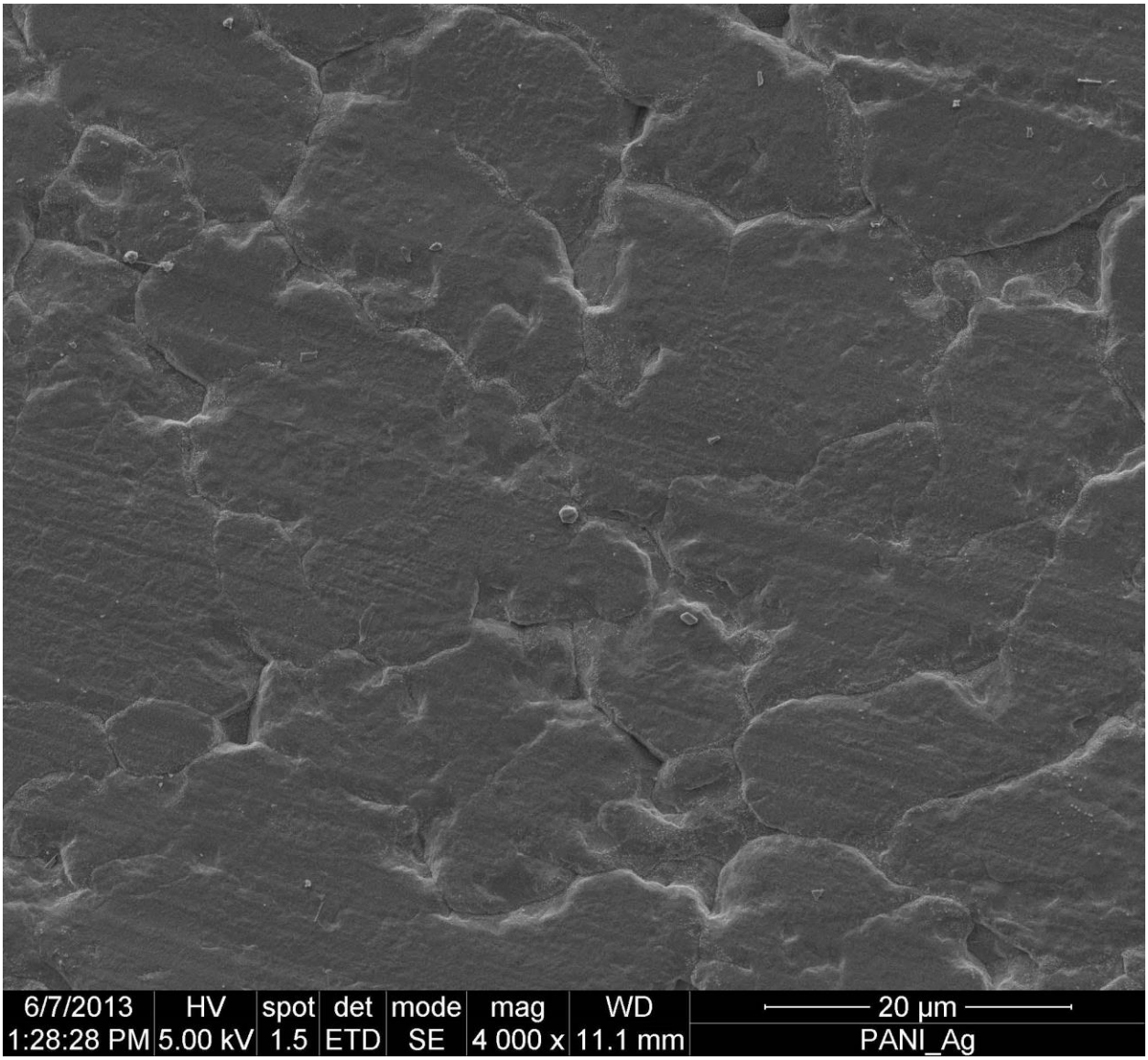
Pre-run Materials



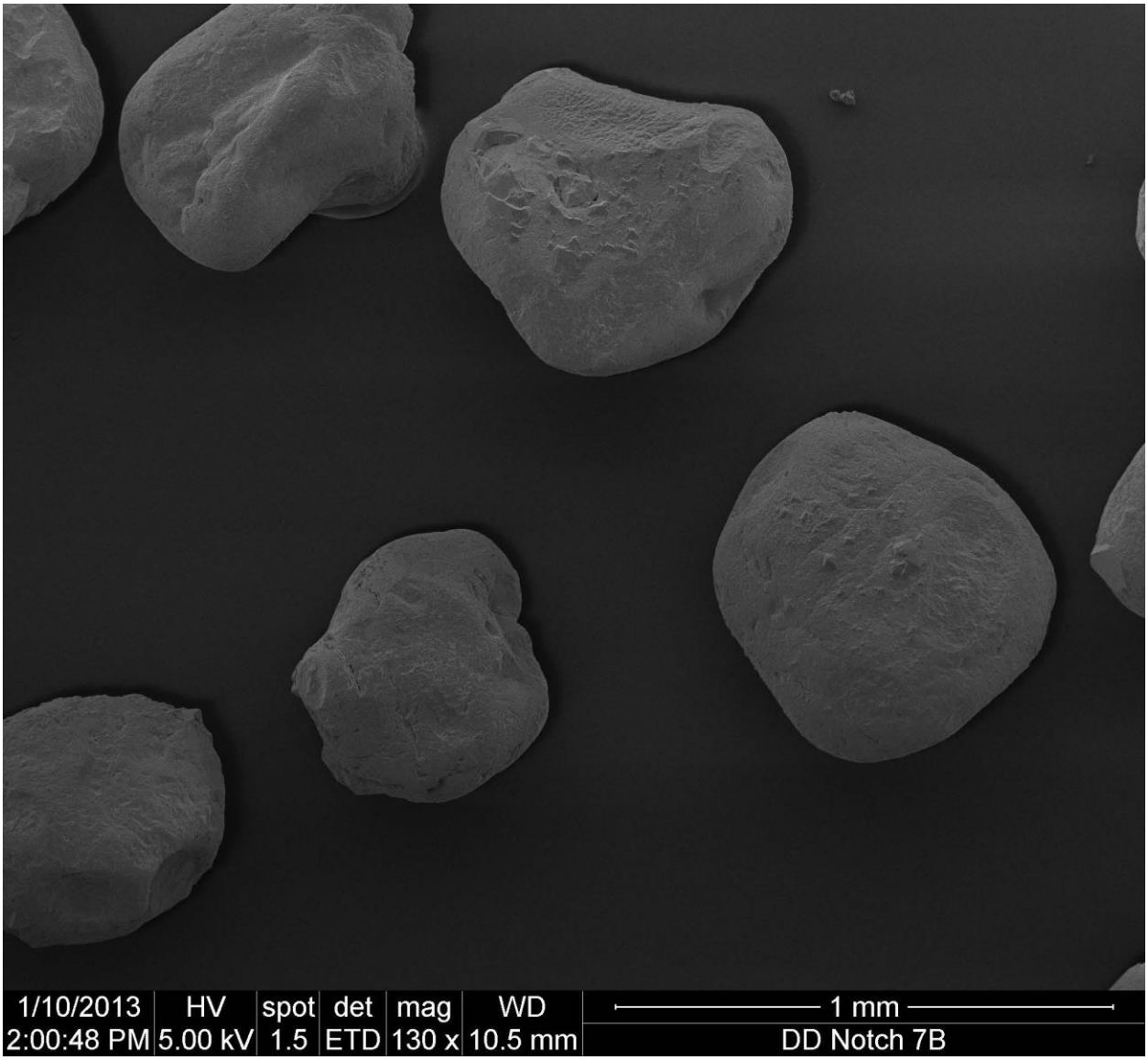
A.0-1 .: SEM image of unaltered 304 Stainless Steel used in EBS 2, EBS 5, and EBS 12



A.0-2: SEM image of unaltered copper foil



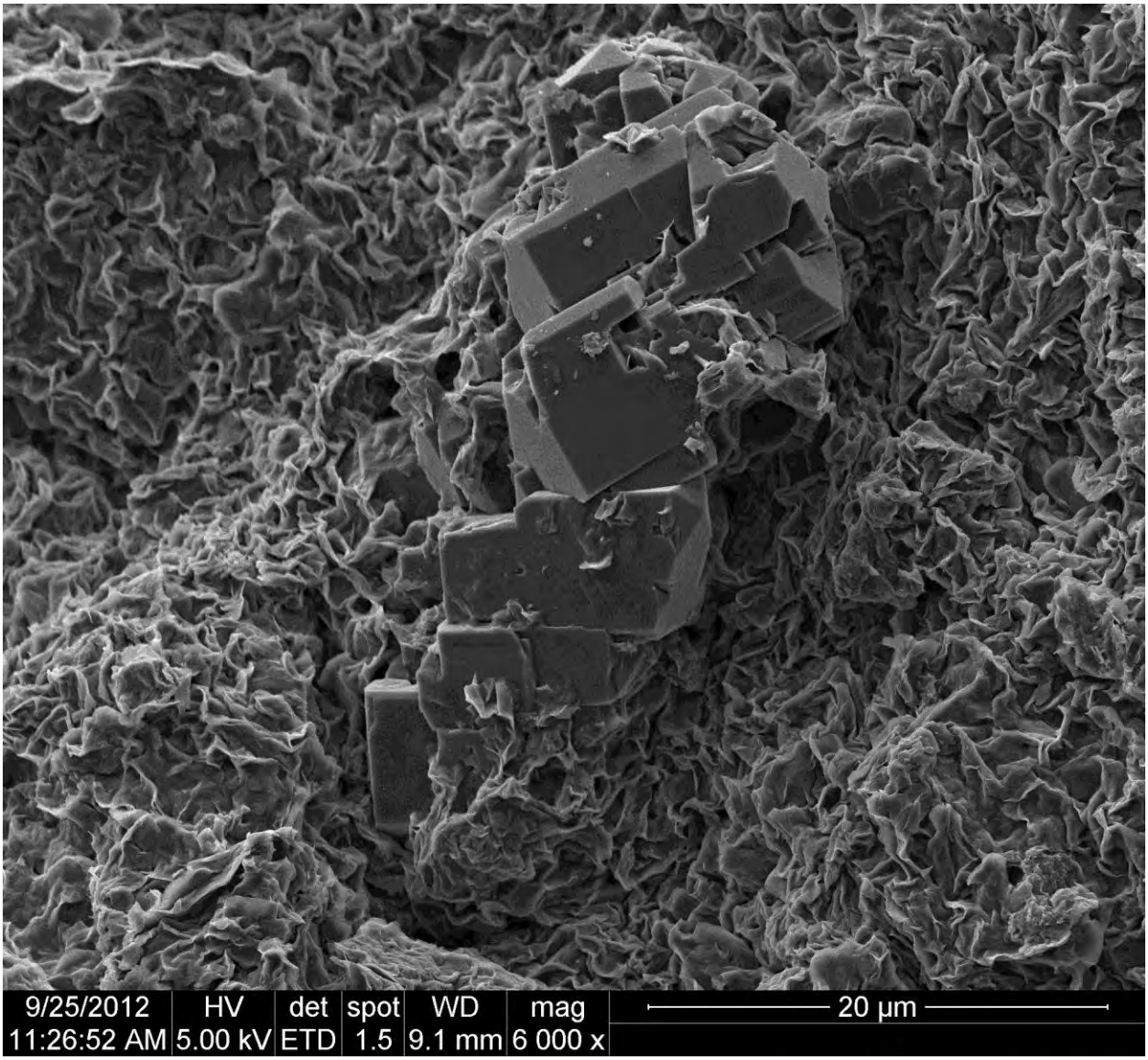
A.0-3: SEM image of unaltered copper surface



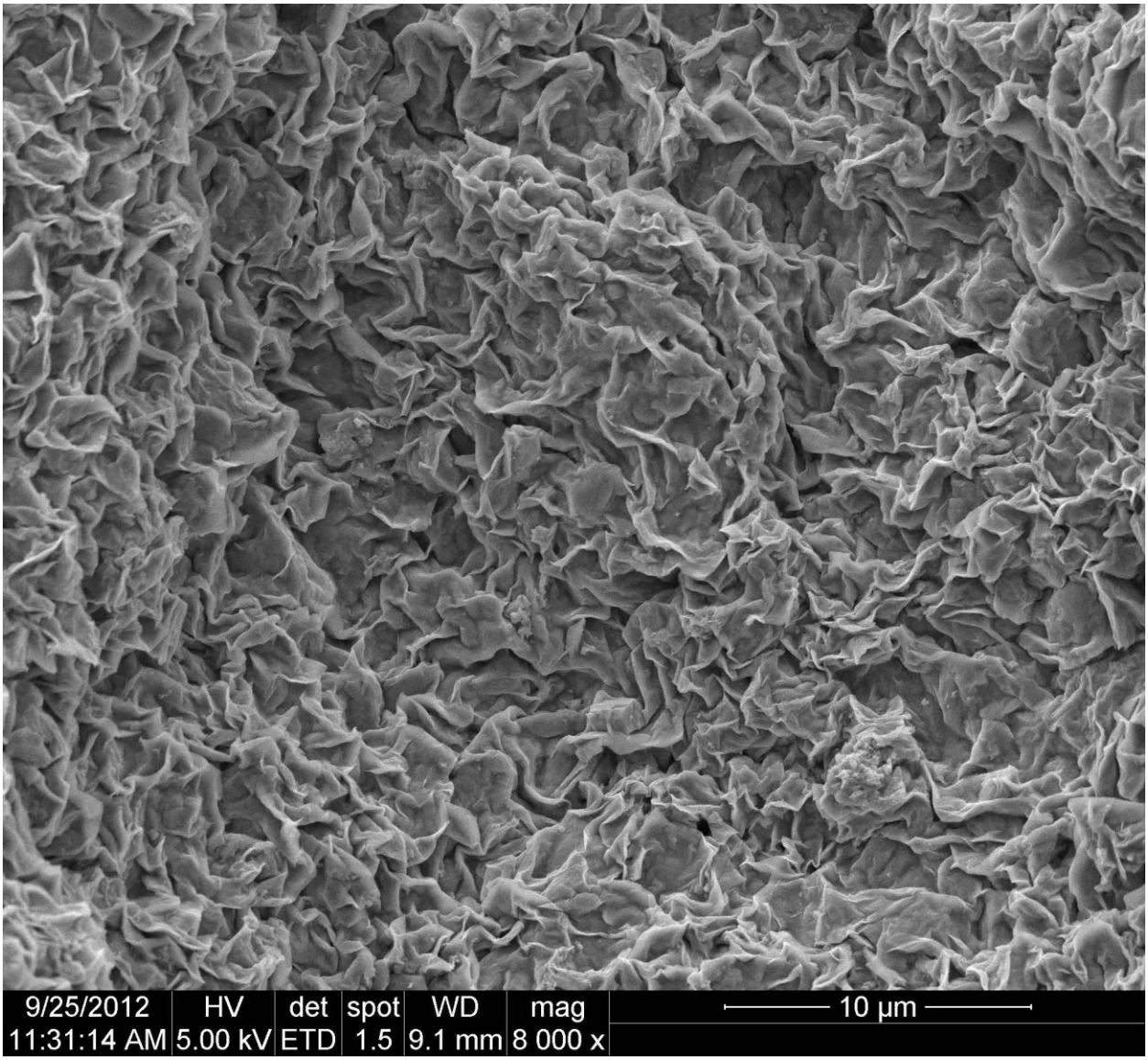
A.0-4: SEM image of unaltered quartz sand grains

Appendix A.1

EBS 1 - Stepped reaction temperature at 150 bar for 4 weeks run with only Bentonite



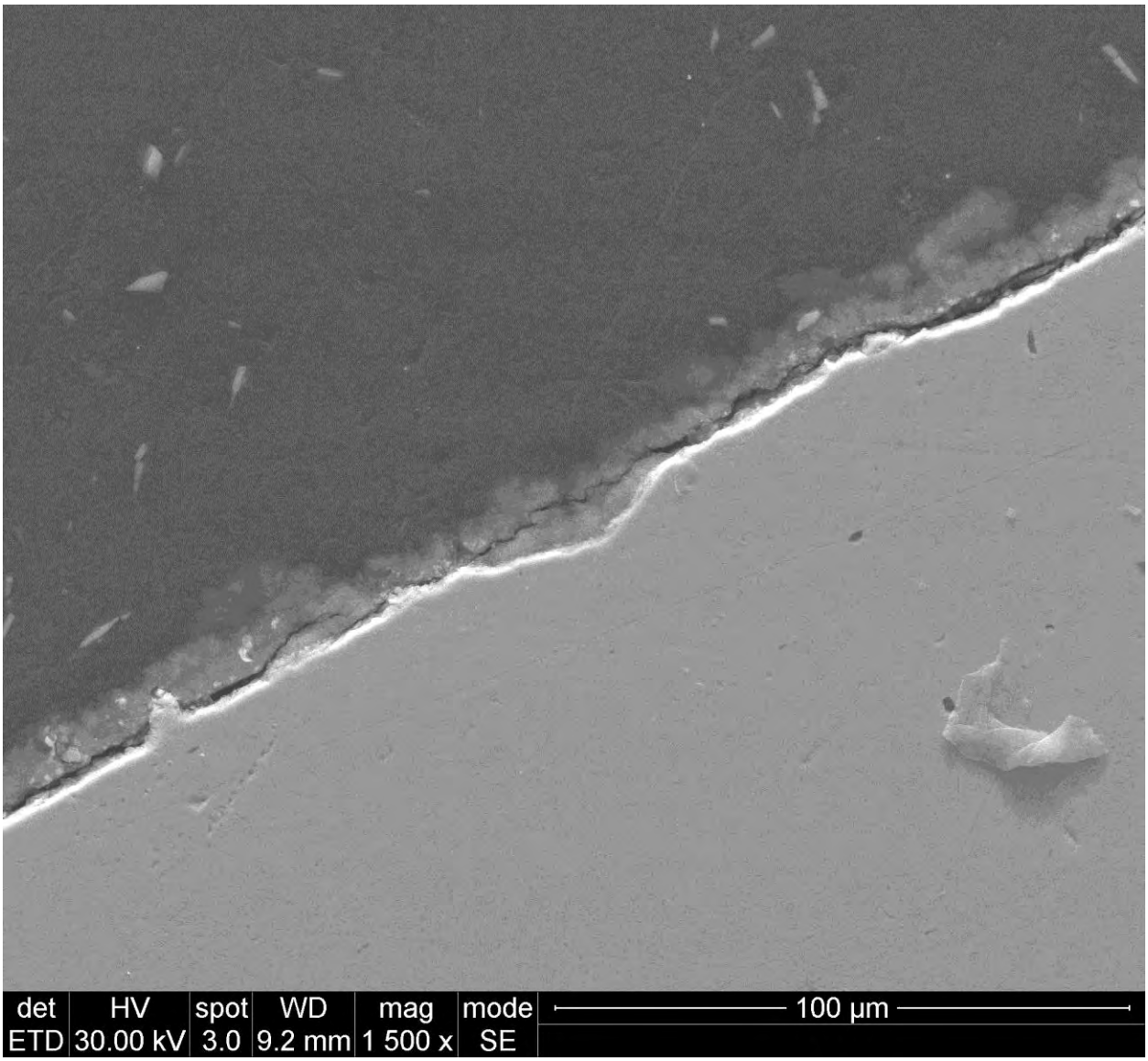
A.1-1: SEM image of authigenic plagioclase granule in bentonite from EBS 1



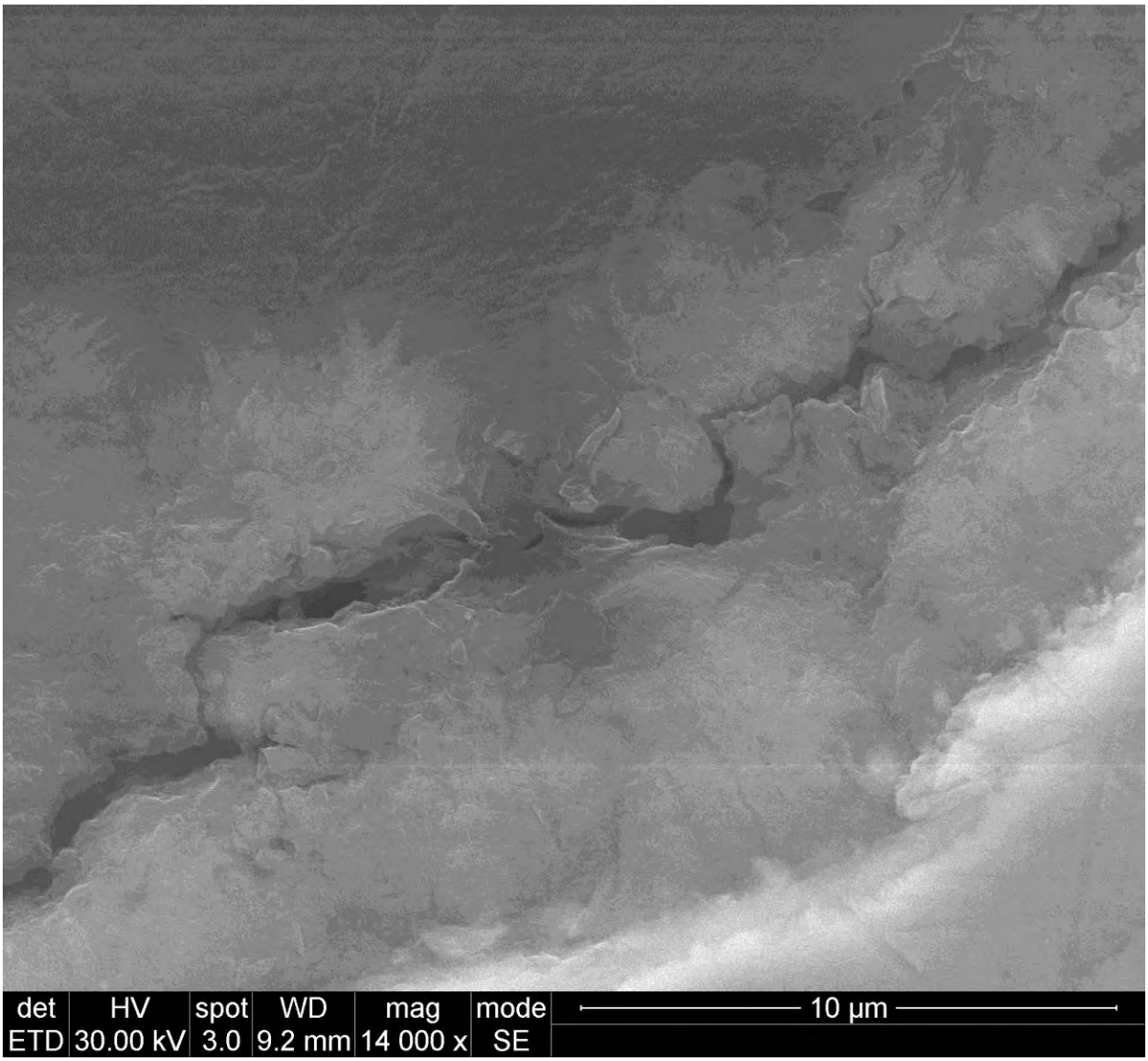
A.1-2: SEM image of smectite in EBS 1

Appendix A.2

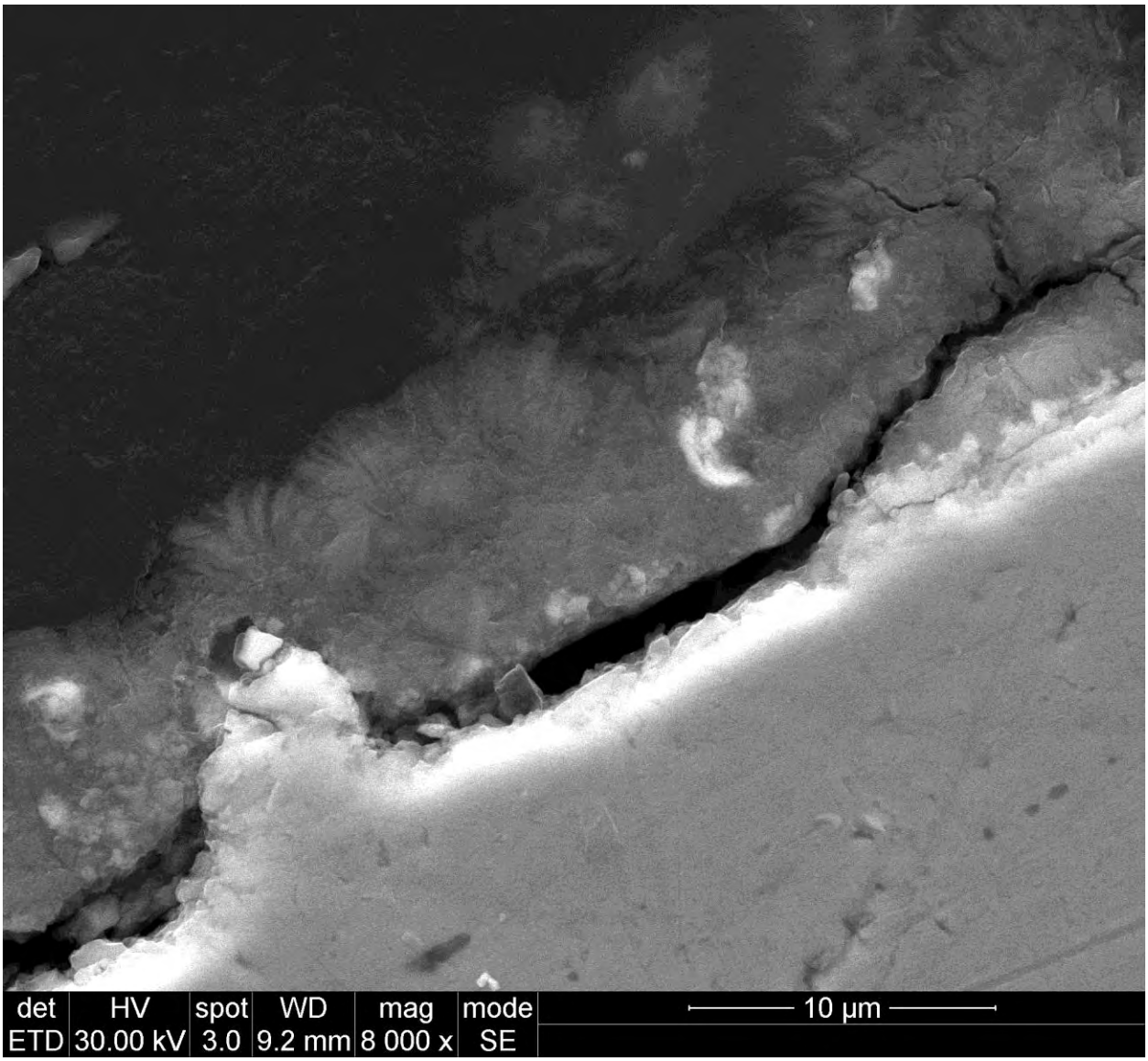
EBS 2 - Stepped reaction temperature (100, 200, 300 ^{o}C) at 150 bar for 4 week run with 304 Stainless Steel



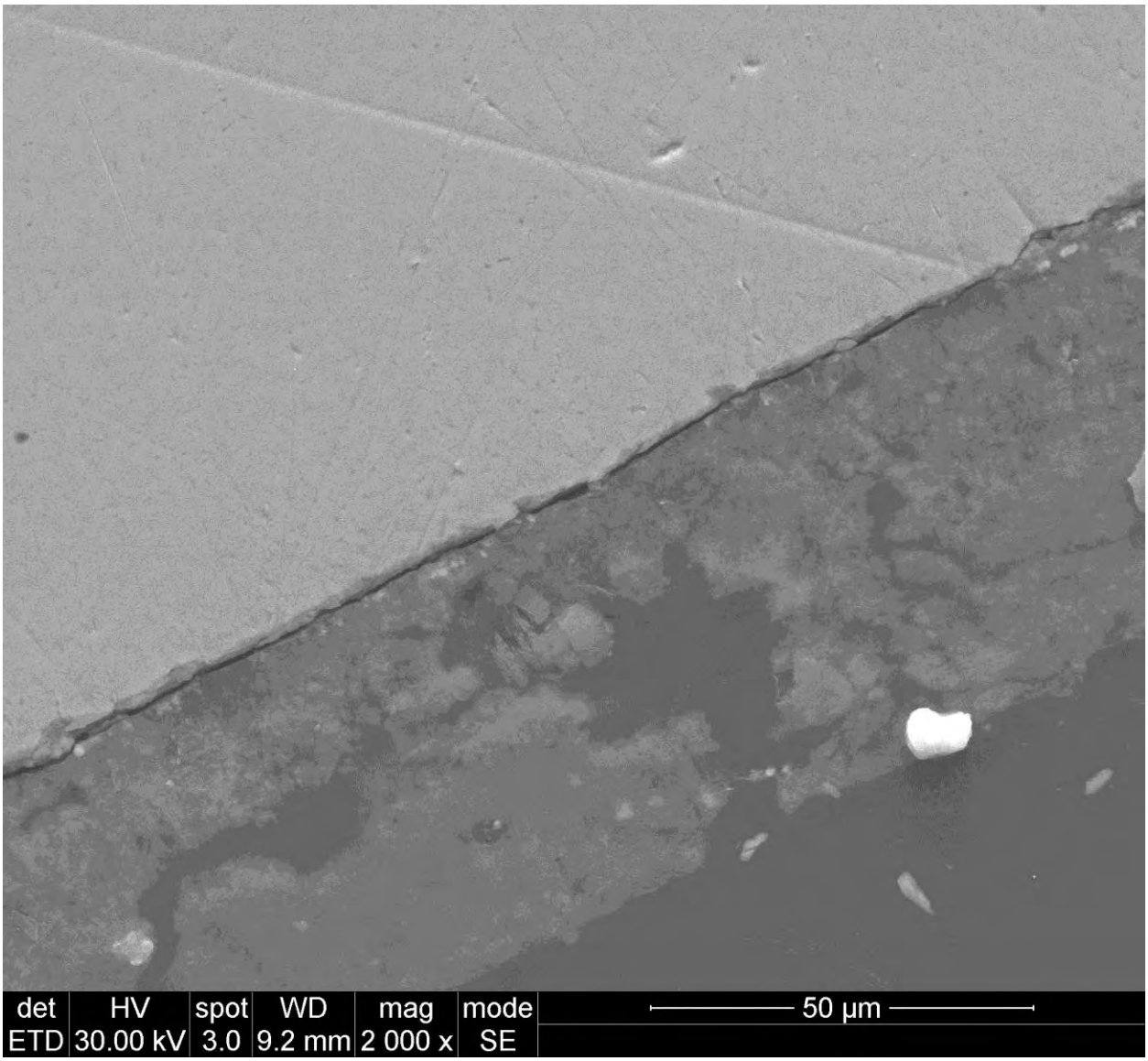
A.2-1: Secondary Electron image of 304 Stainless Steel. Low magnification interface of EBS 2



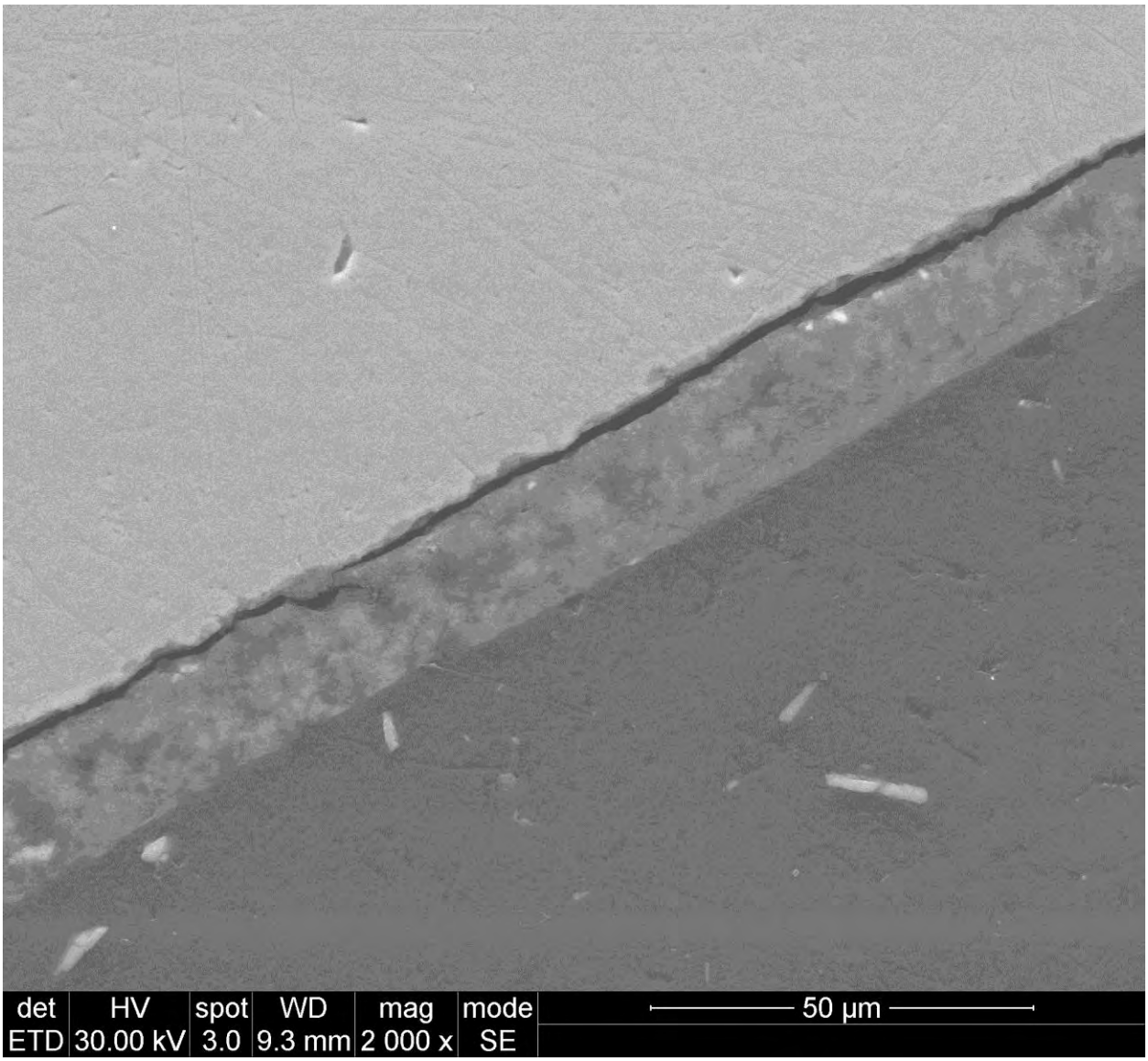
A.2-2: Secondary Electron image of saponite interface on 304 Stainless Steel (EBS 2).



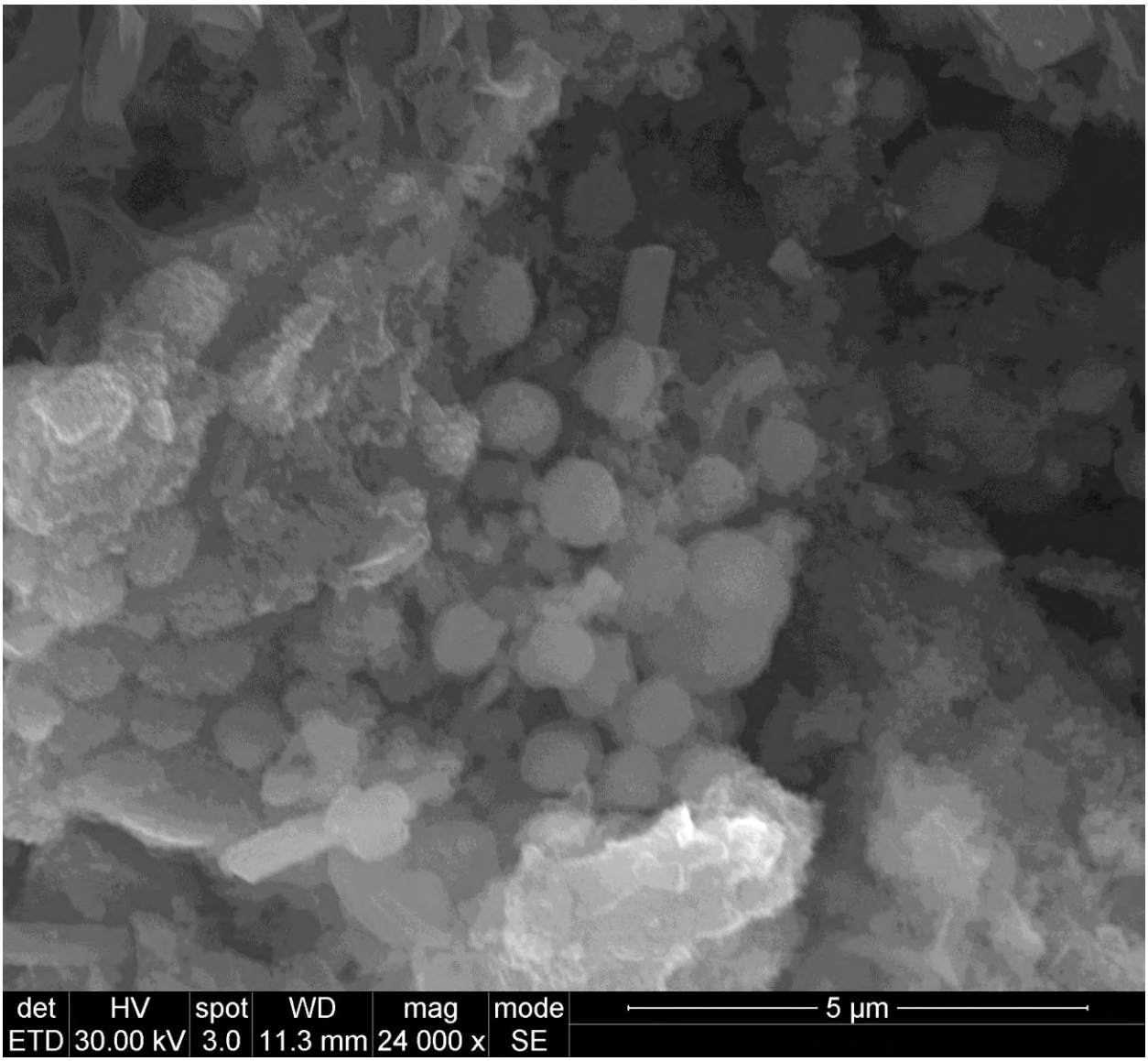
A.2-3: Secondary Electron image of Saponite interface on 304 Stainless Steel from EBS 2



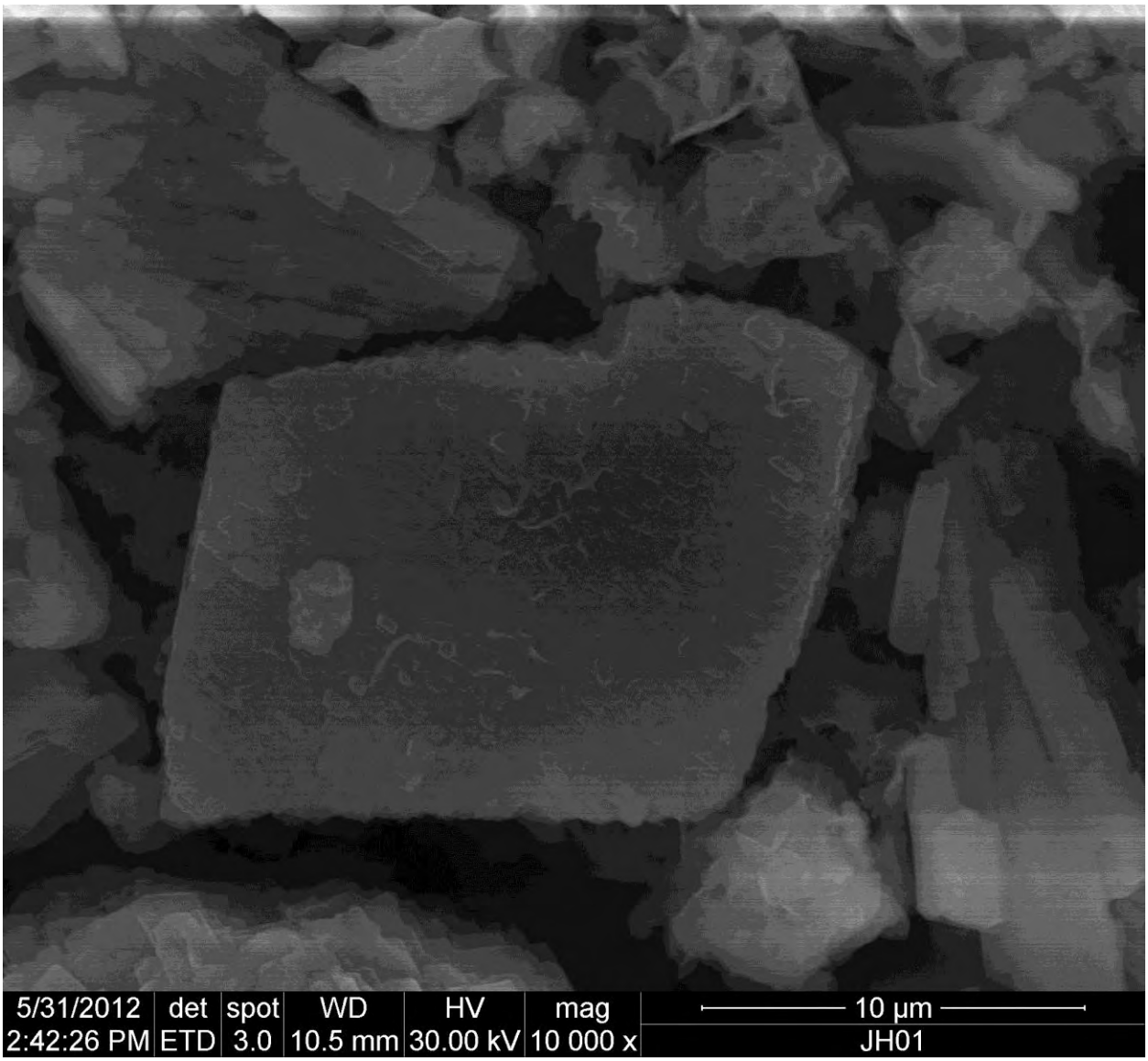
A.2-4: Secondary Electron image of saponite interface on 304 Stainless Steel. (high magnification image of EBS 2)



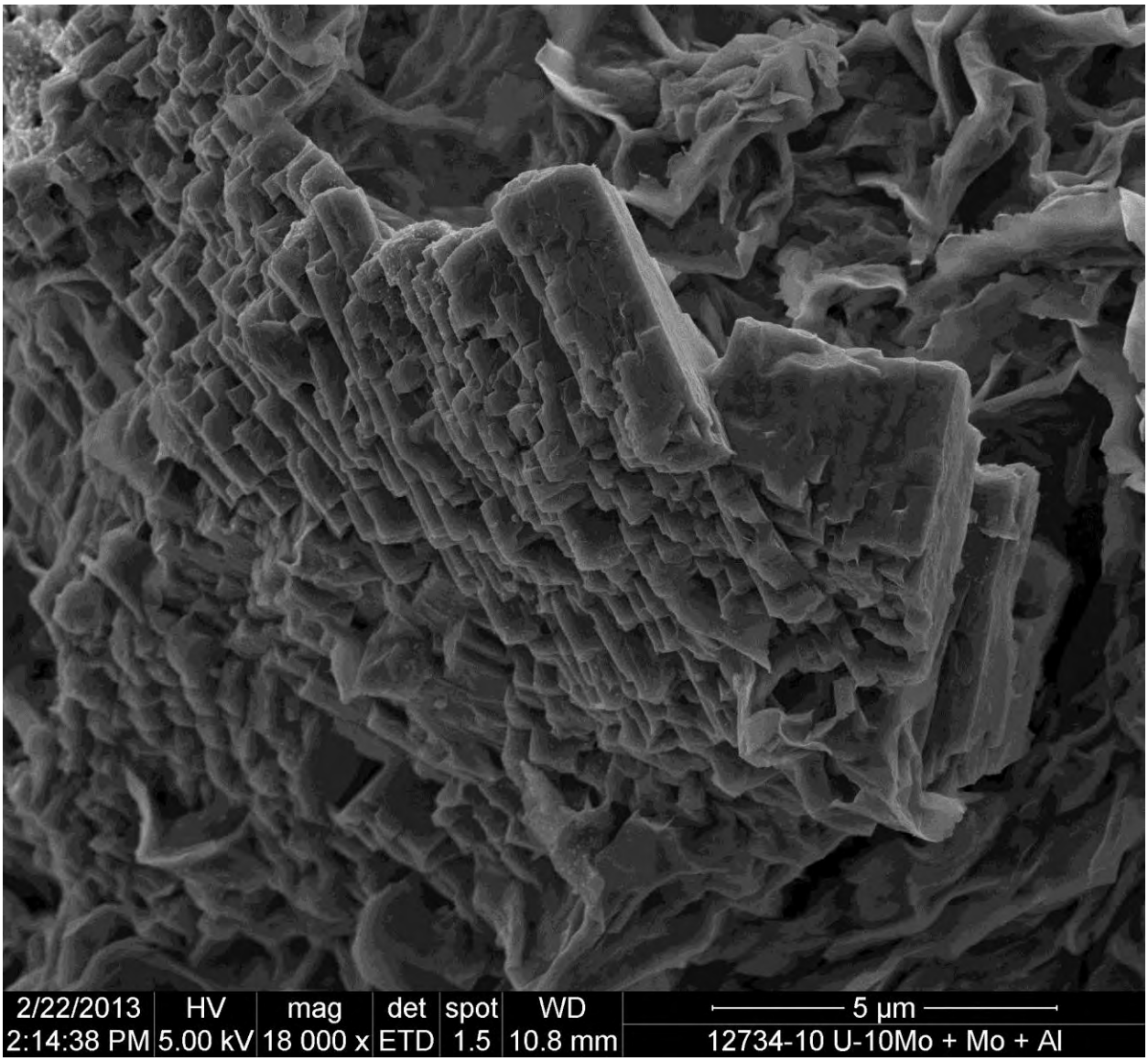
A.2-5: Secondary Electron image of saponite interface on 304 Stainless Steel (low magnification from EBS 2)



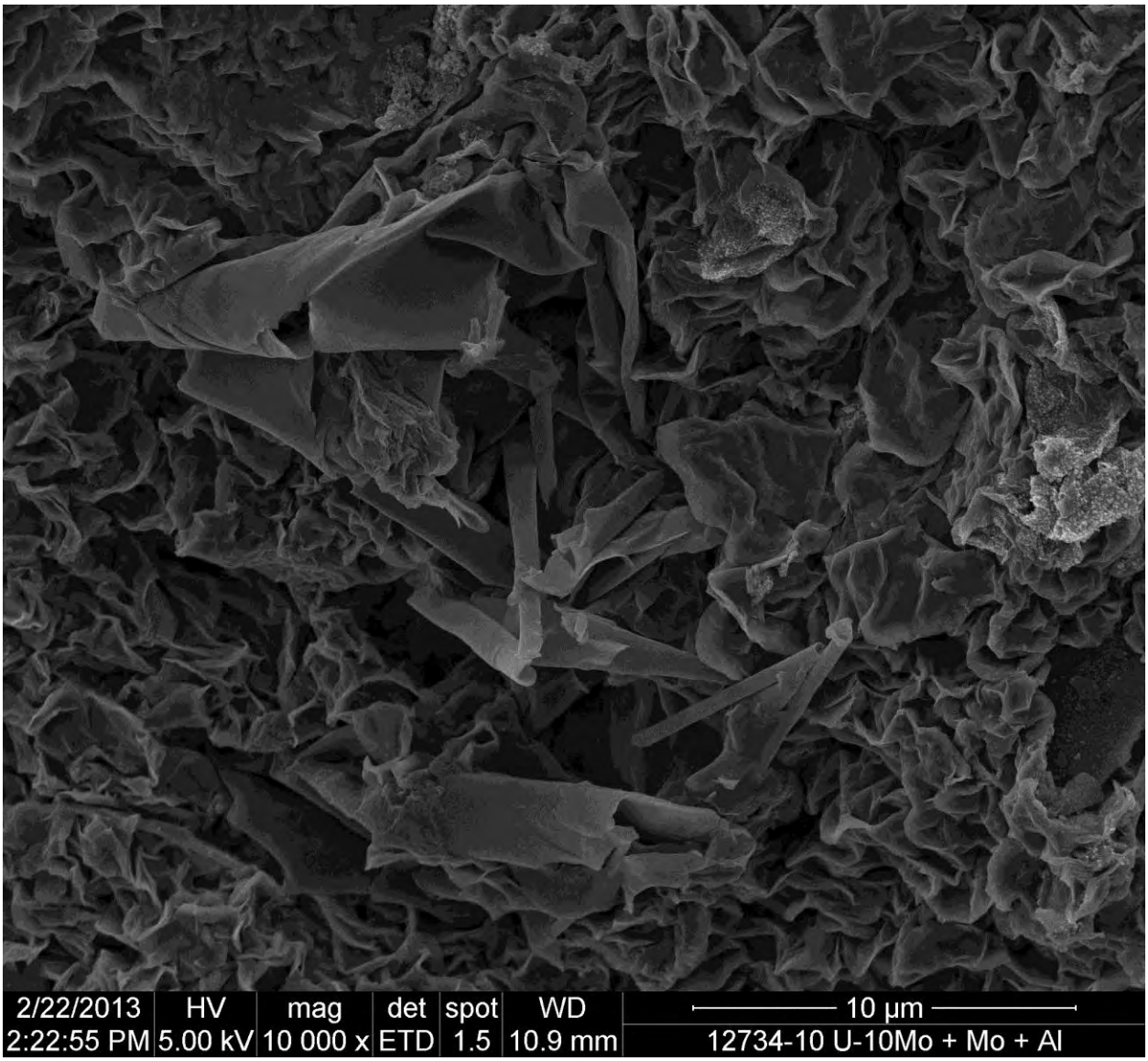
A.2-6: SEM image of opal spheres found in EBS 2



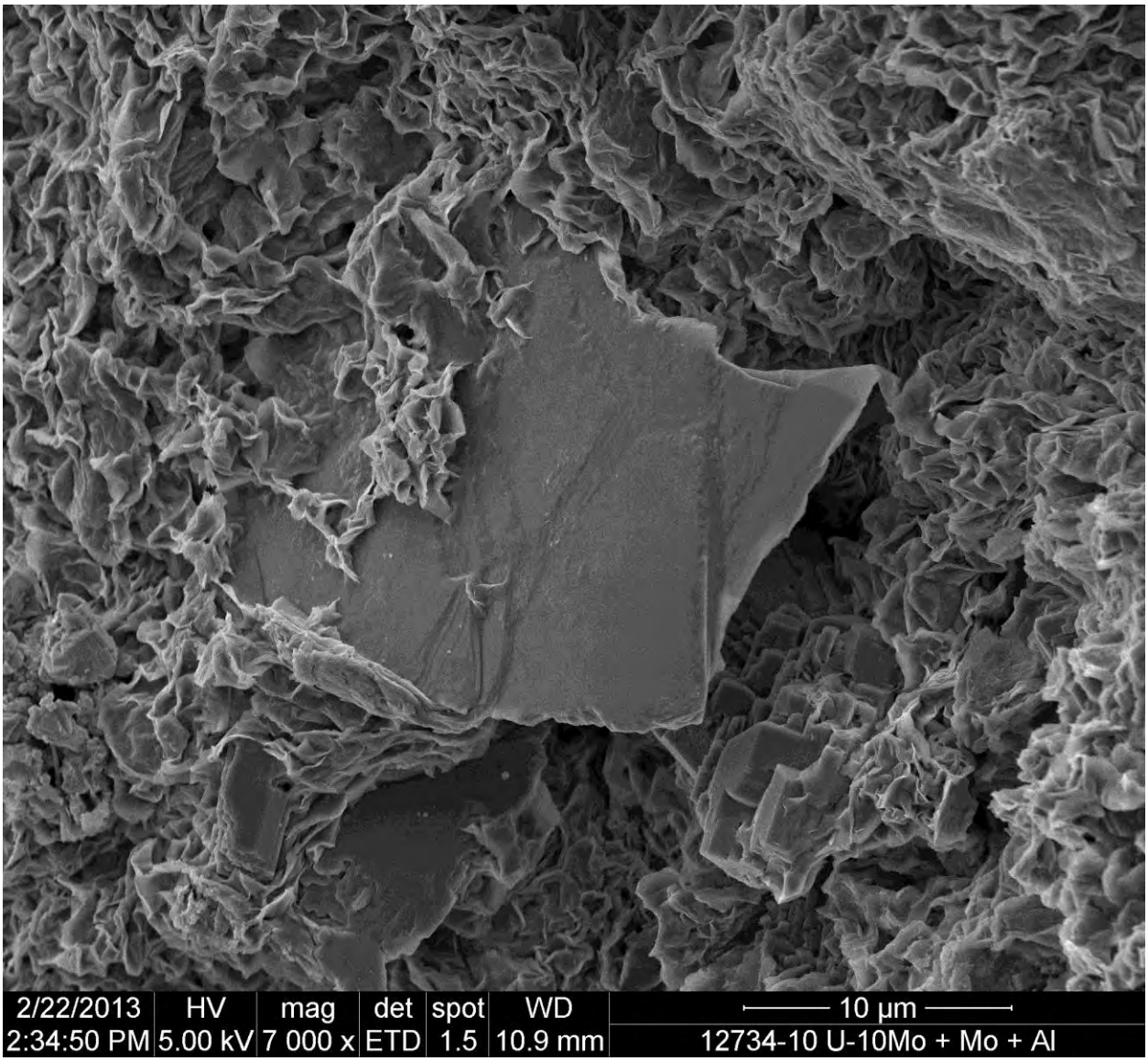
A.2-7: SEM image of potassium feldspar phenocryst from EBS 2



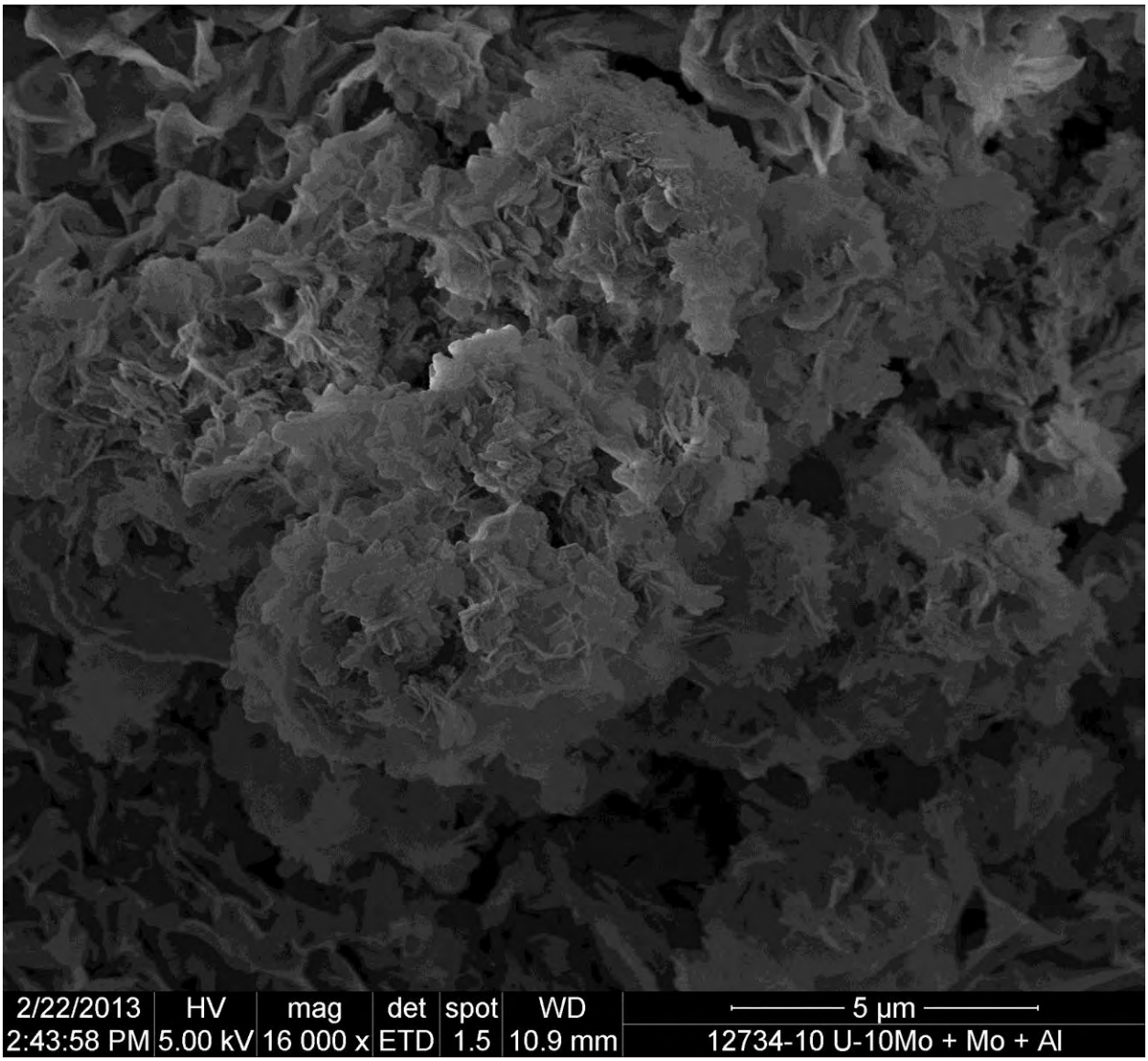
A.2-8: SEM image of potassium feldspar in the bulk matrix of EBS 2



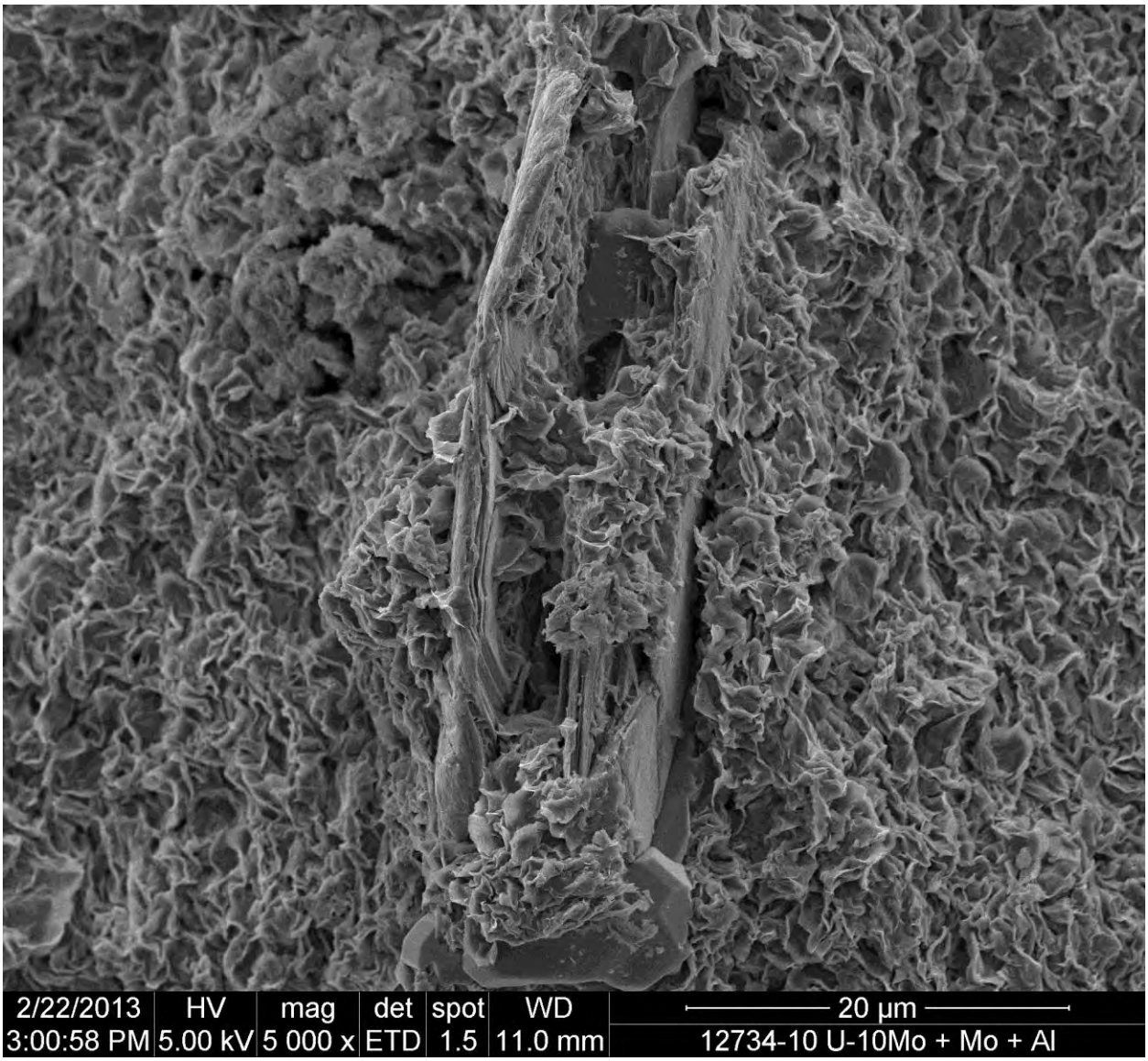
A.2-9: SEM image of bentonite bulk composition from EBS 2



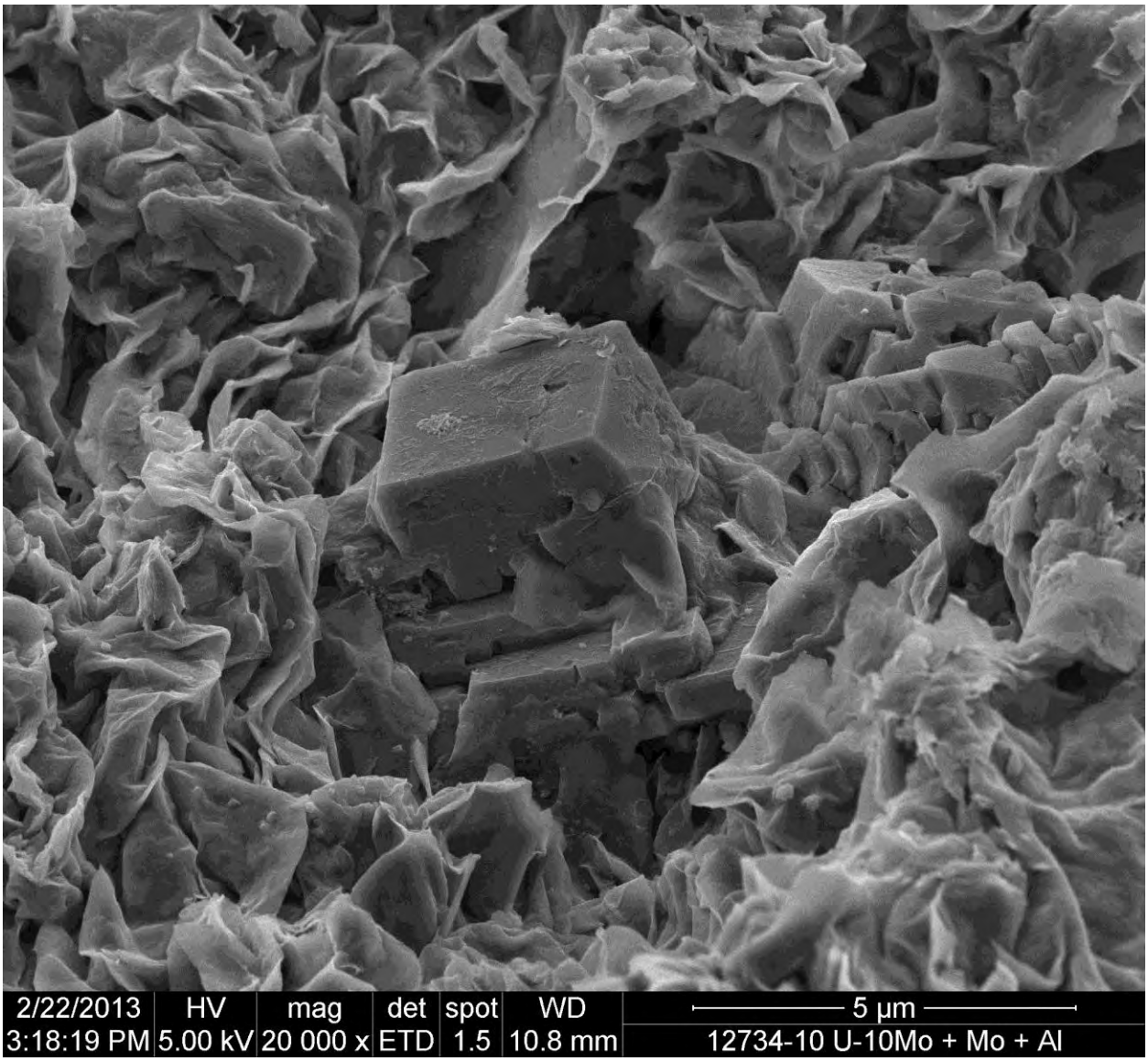
A.2-10: SEM image of EBS 2 bulk composition. Note incomplete biotite phenocrysts in center.



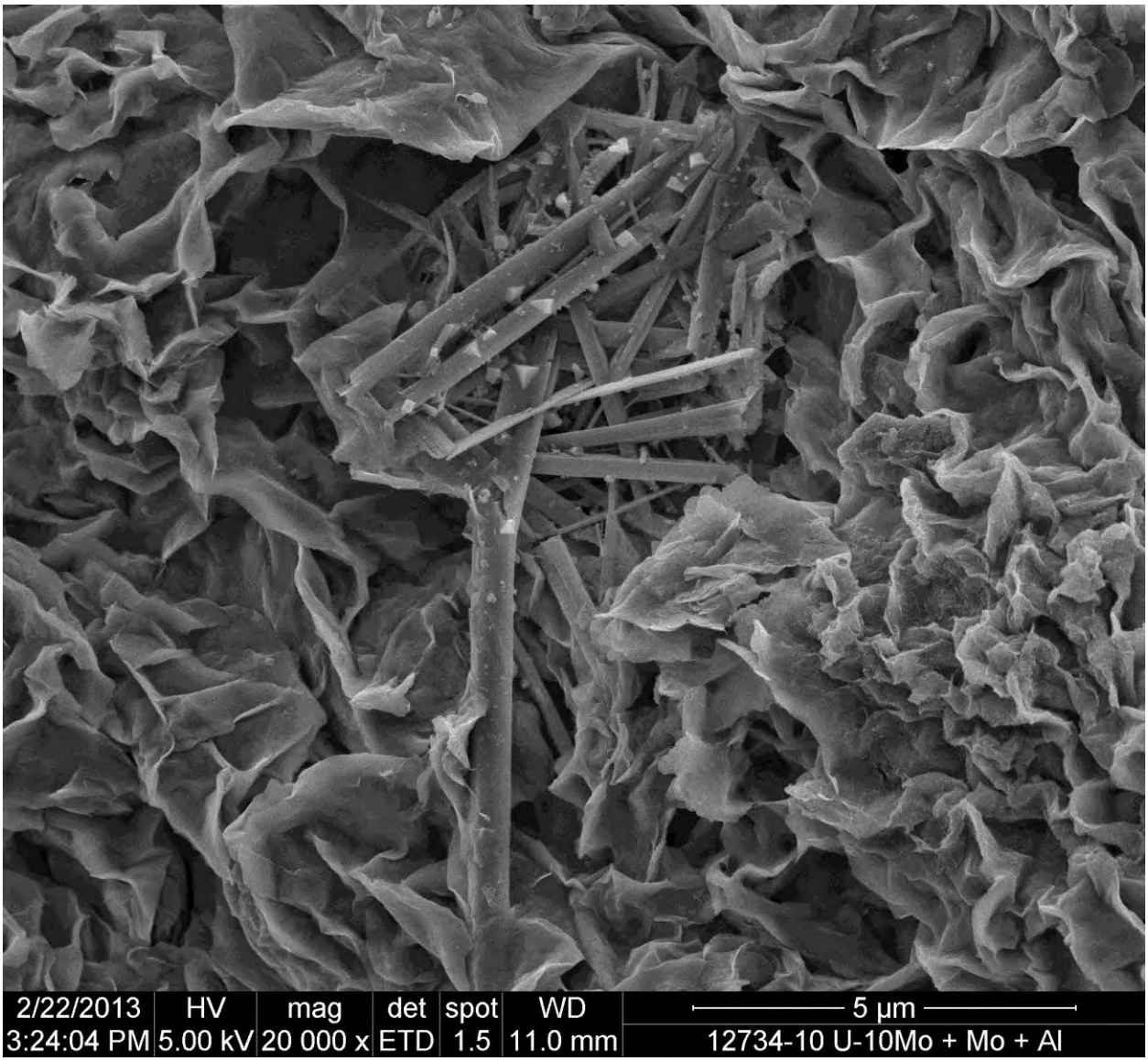
A.2-11: SEM image of secondary smectite in EBS 2



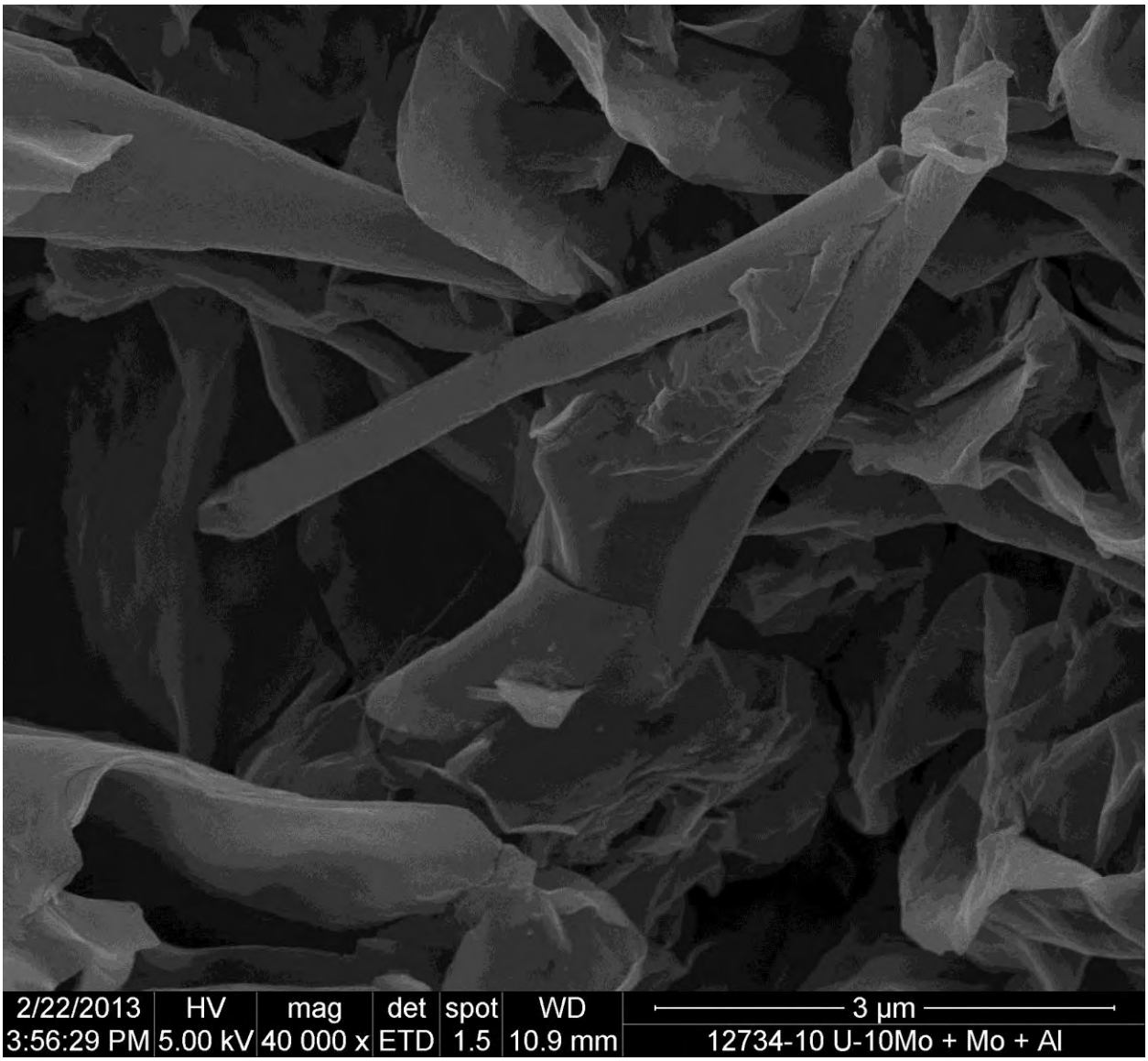
A.2-12: SEM image of clay replacing center of biotite phenocryst in EBS 2



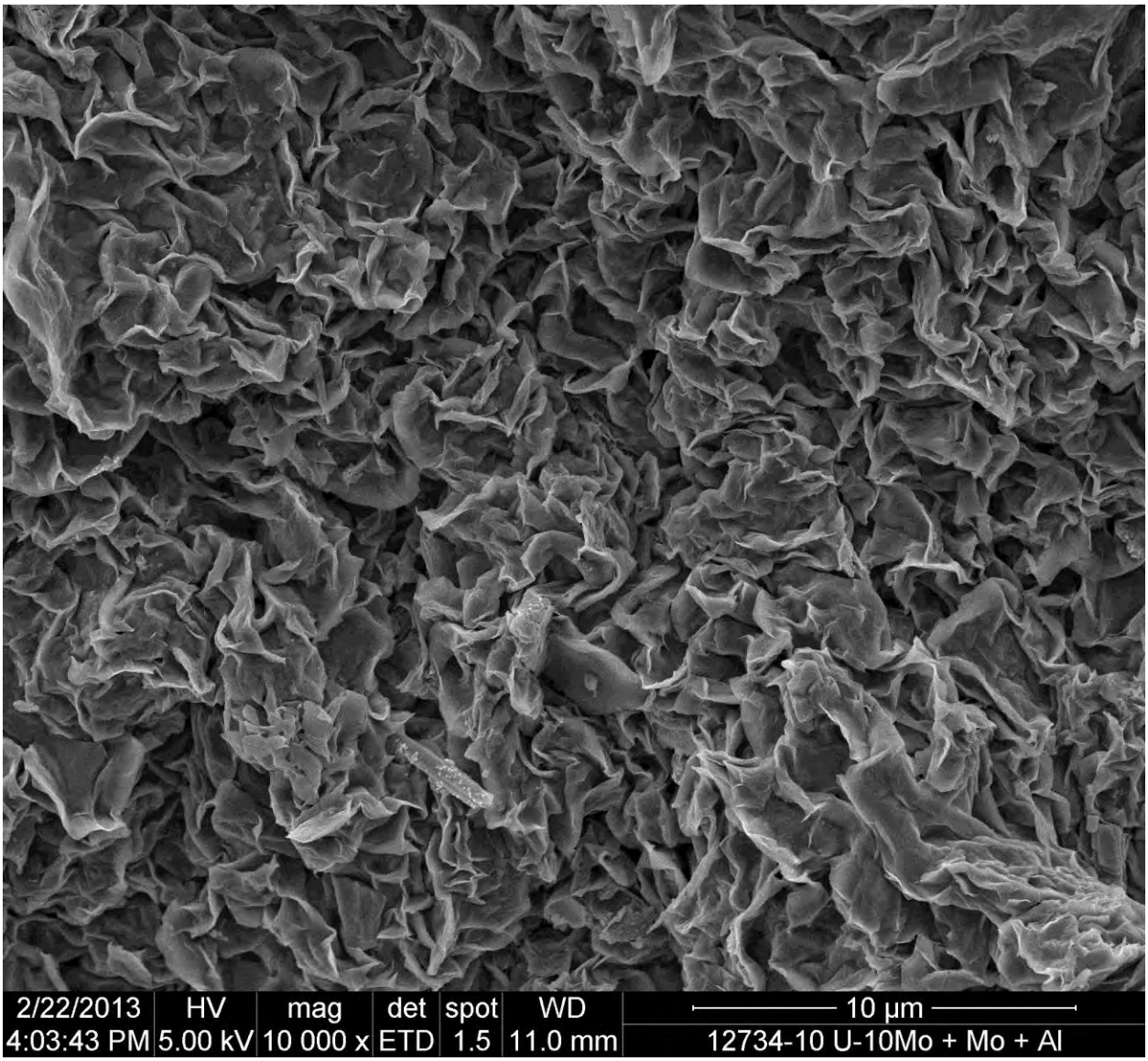
A.2-13: SEM image of pyrite in bentonite from EBS 2



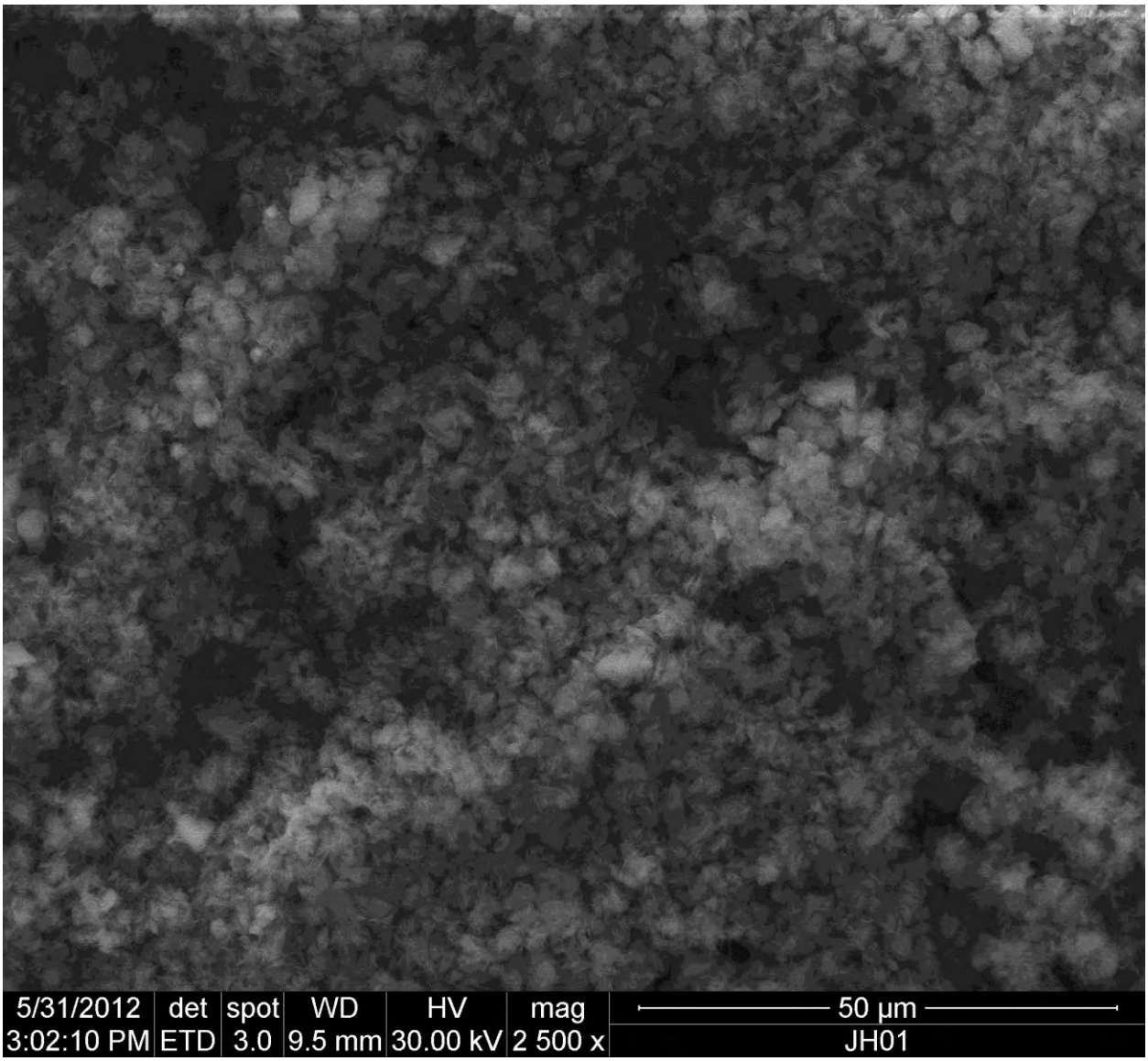
A.2-14: SEM image of Clinoptilolite in bentonite of EBS 2



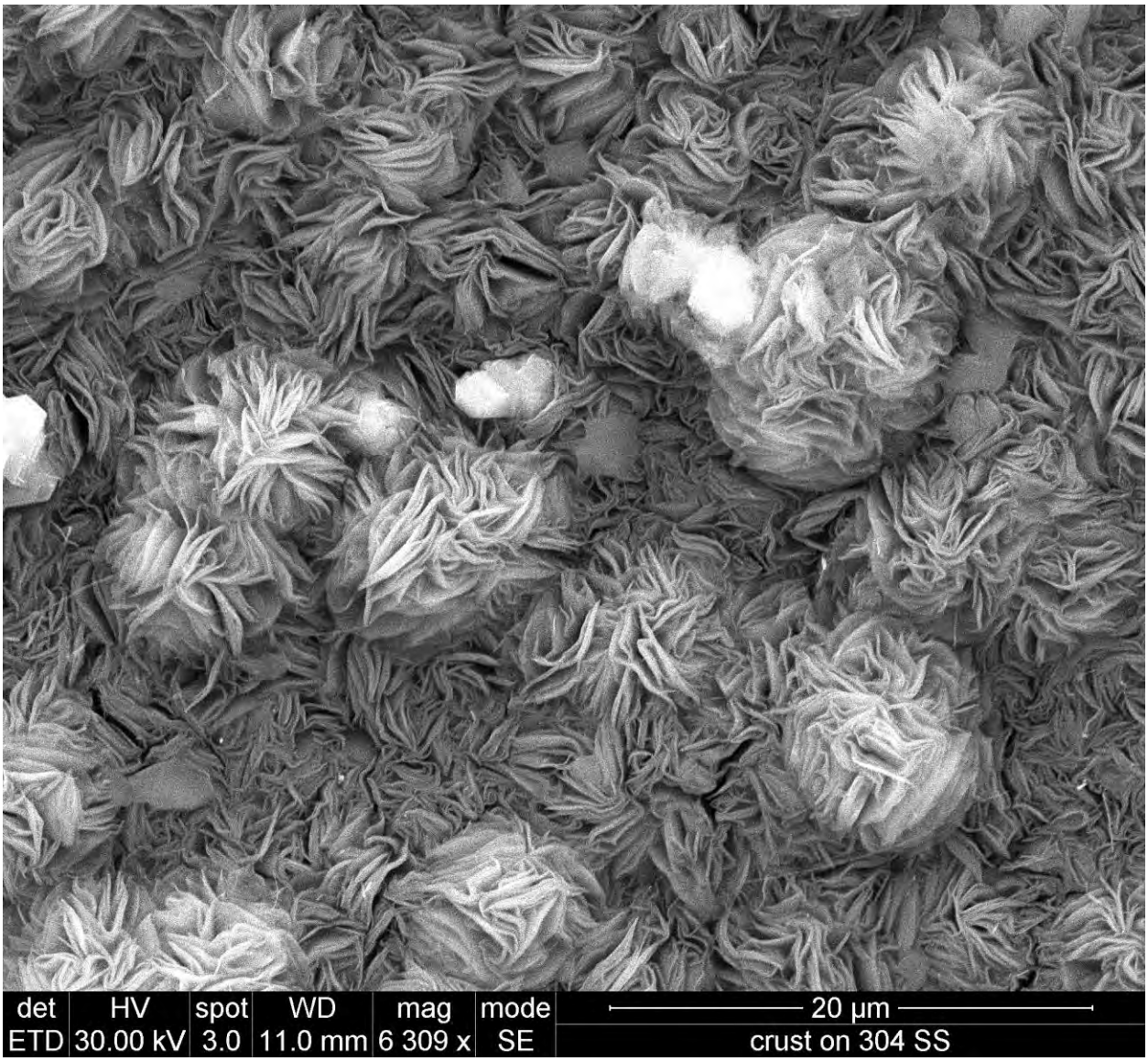
A.2-15: SEM image of bentonite tubes from EBS 2



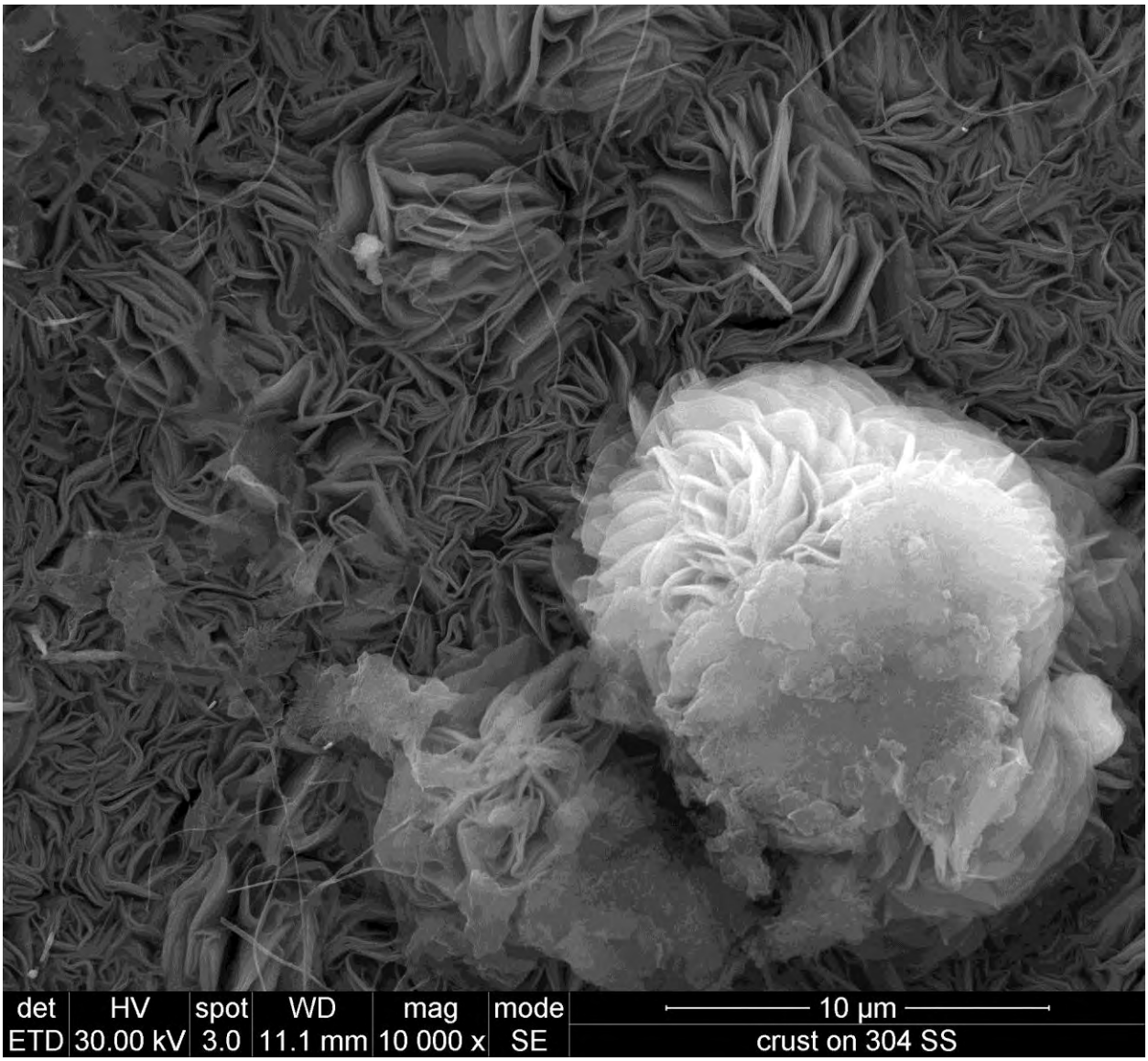
A.2-16: SEM image of foliated smectite from EBS 2



A.2-17: SEM image of iron saponite coating on 304 Stainless Steel. (low magnification - EBS 2)



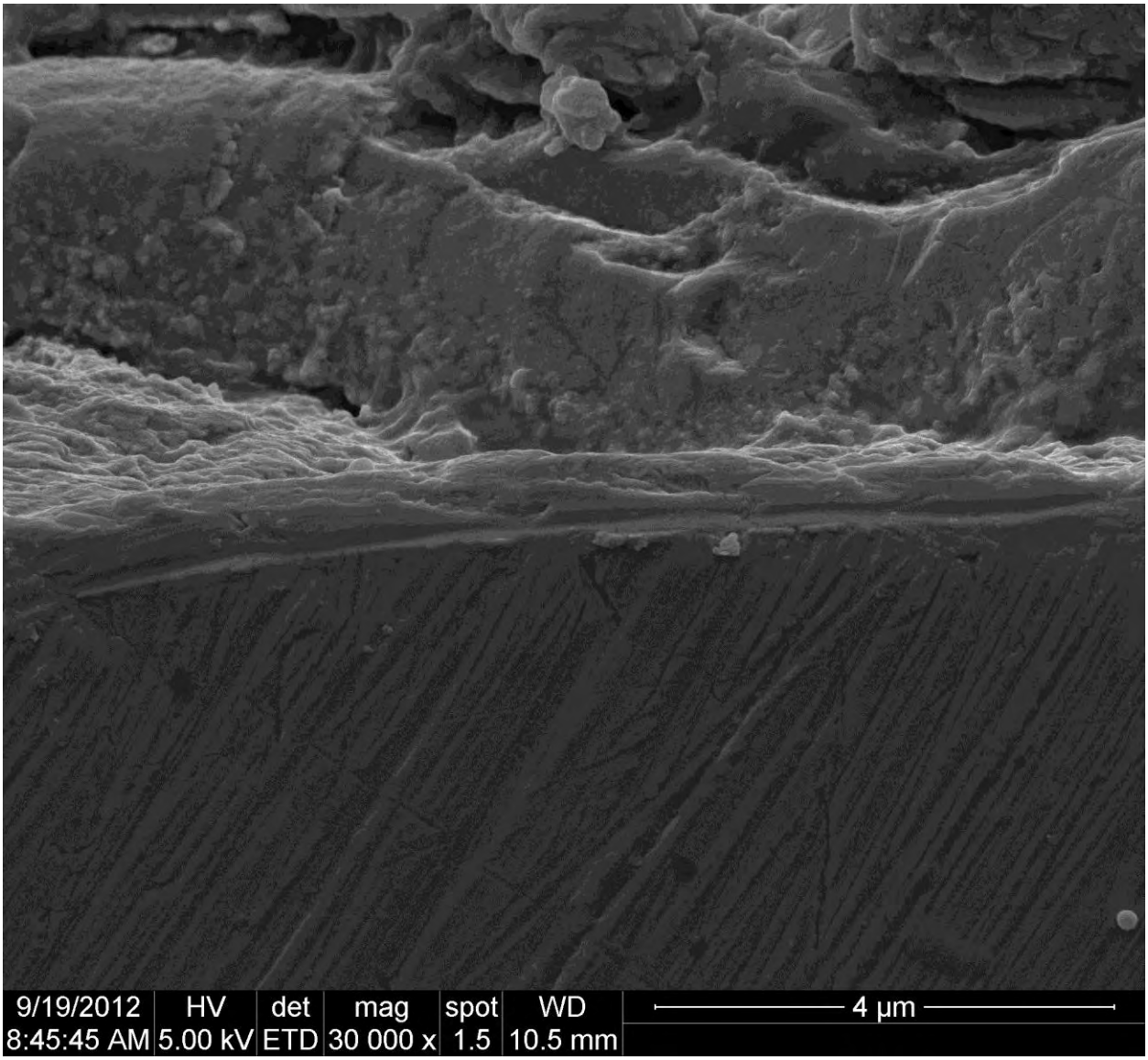
A.2-18: SEM image of saponite crust on 304 Stainless Steel from EBS 2



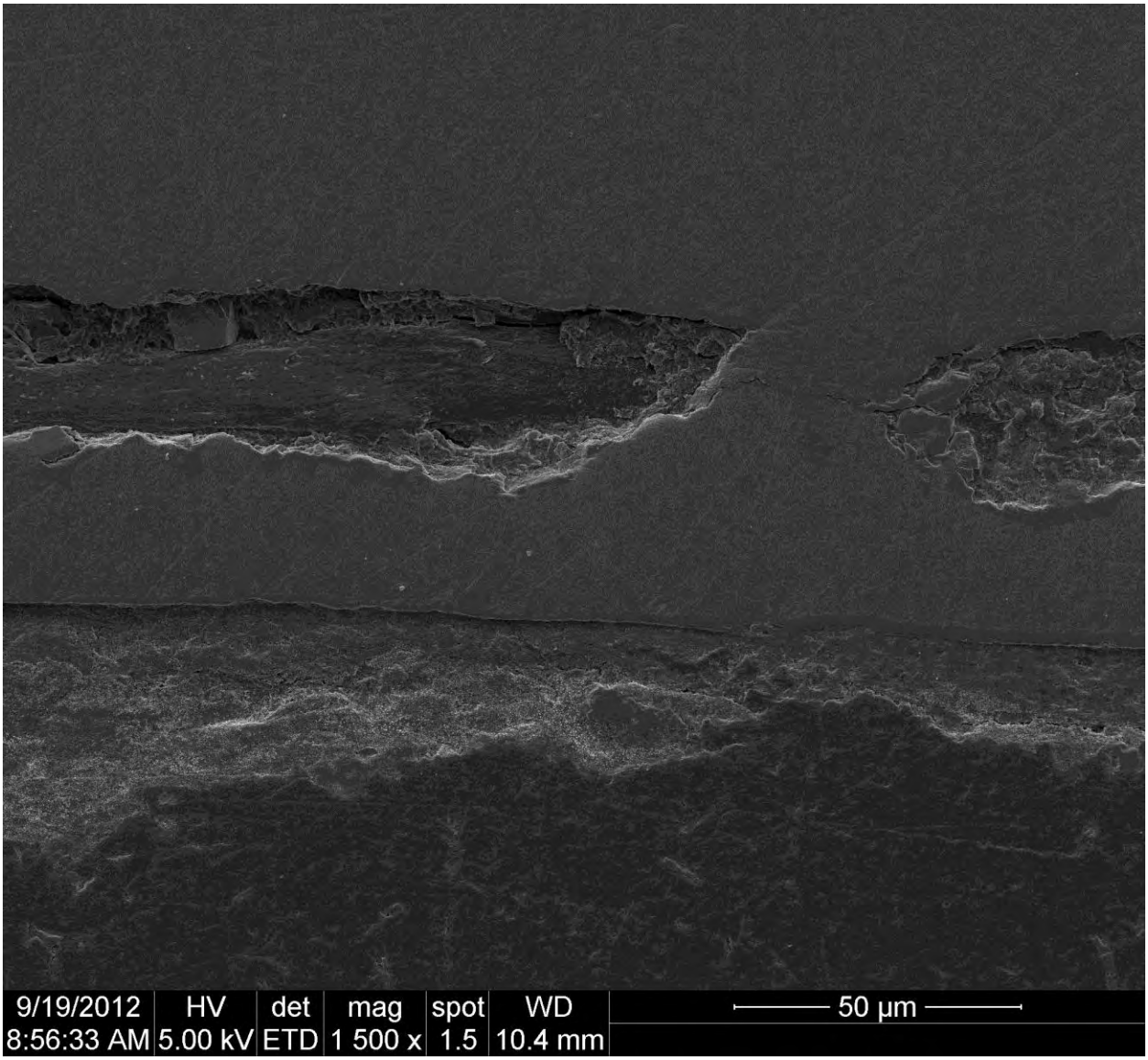
A.2-19: SEM image of secondary semectite on saponite on 304 Stainless Steel from EBS 2. Fibrous mineral phase unknown.

Appendix A.3

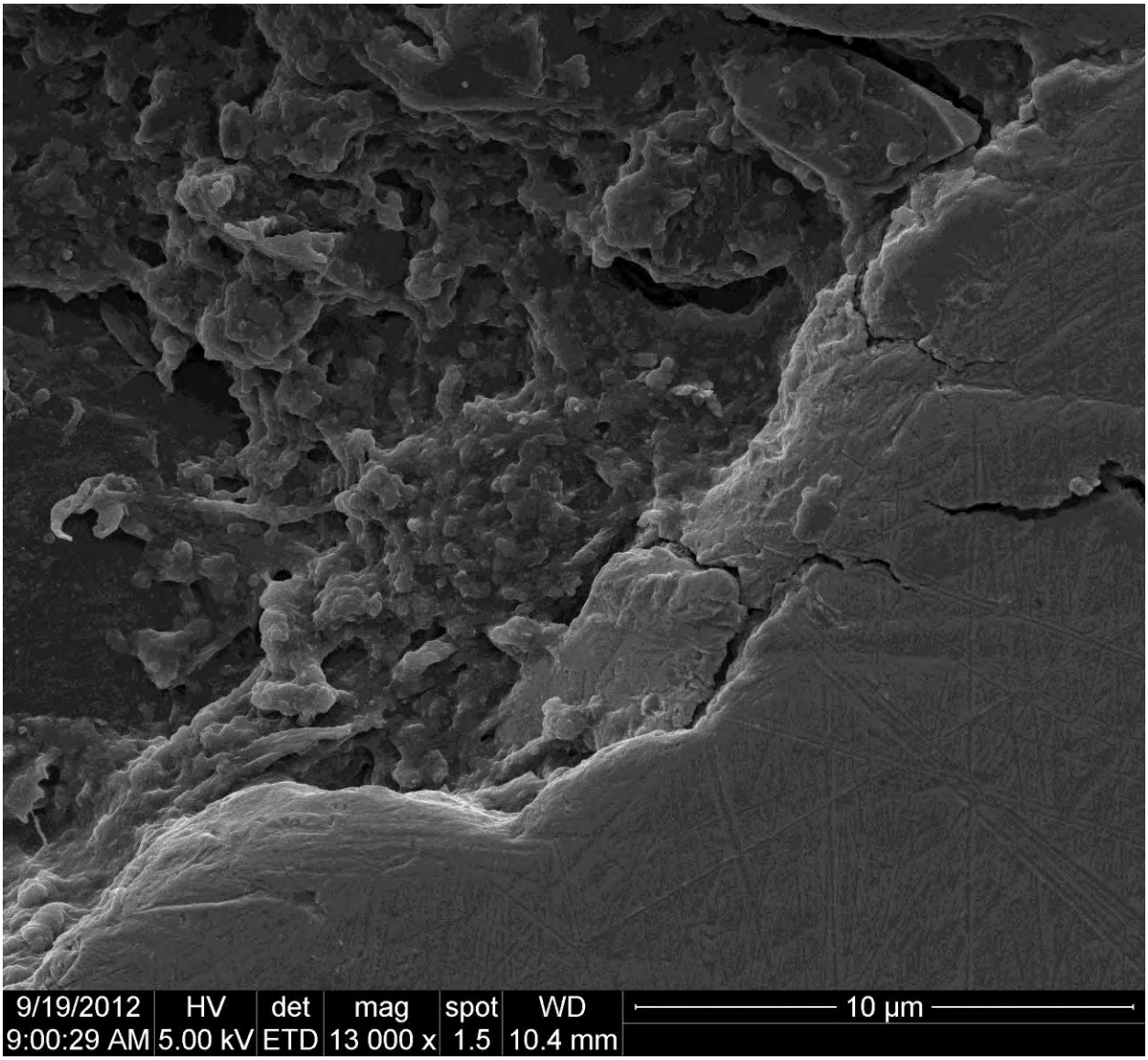
EBS-3 Step temperature increase (100, 200, 300 ^{o}C), 150 bar for 5 weeks run with 316 Stainless Steel



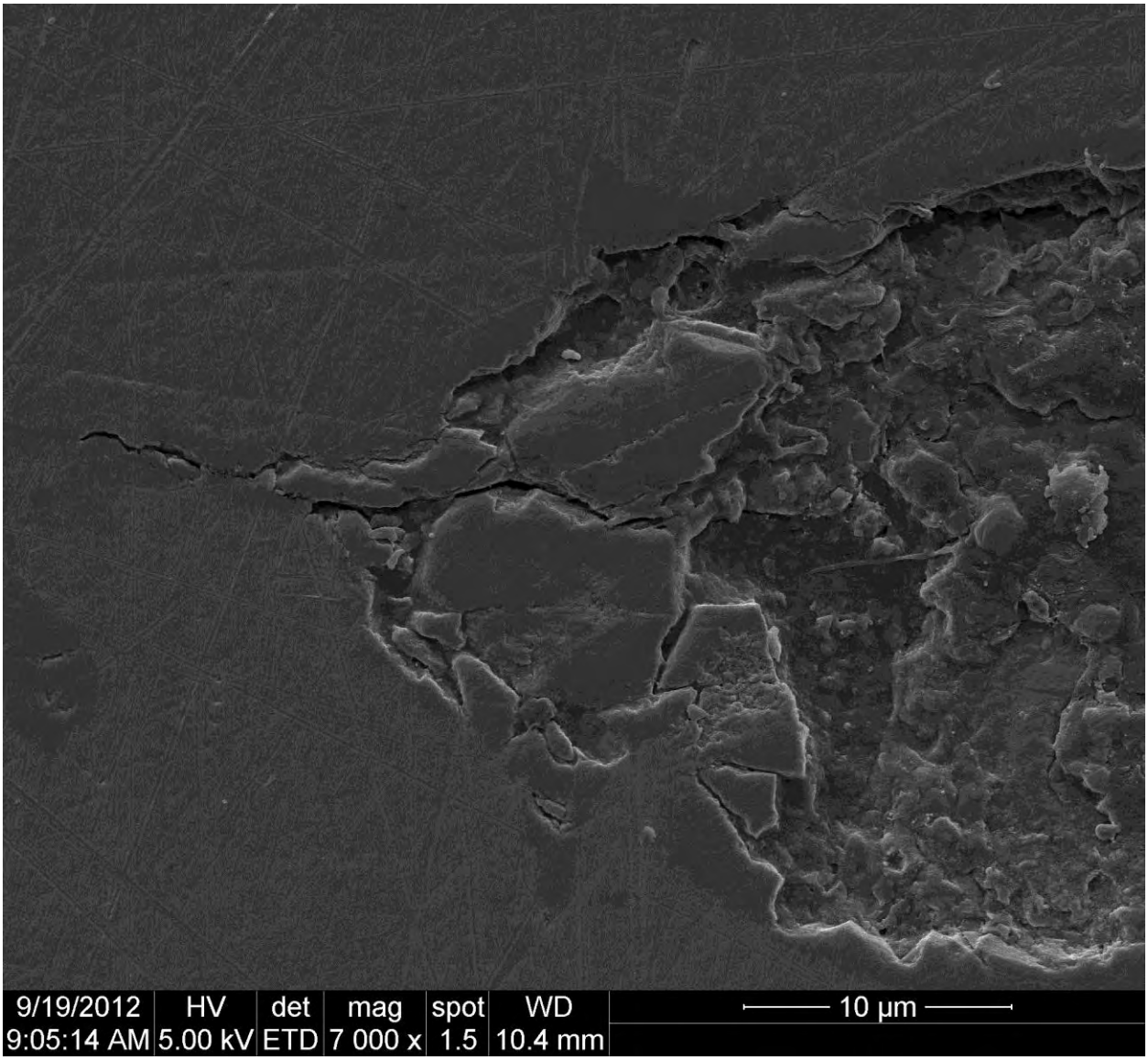
A.3-1: SEM image close up of 316 Stainless Steel interface cross section of EBS 3



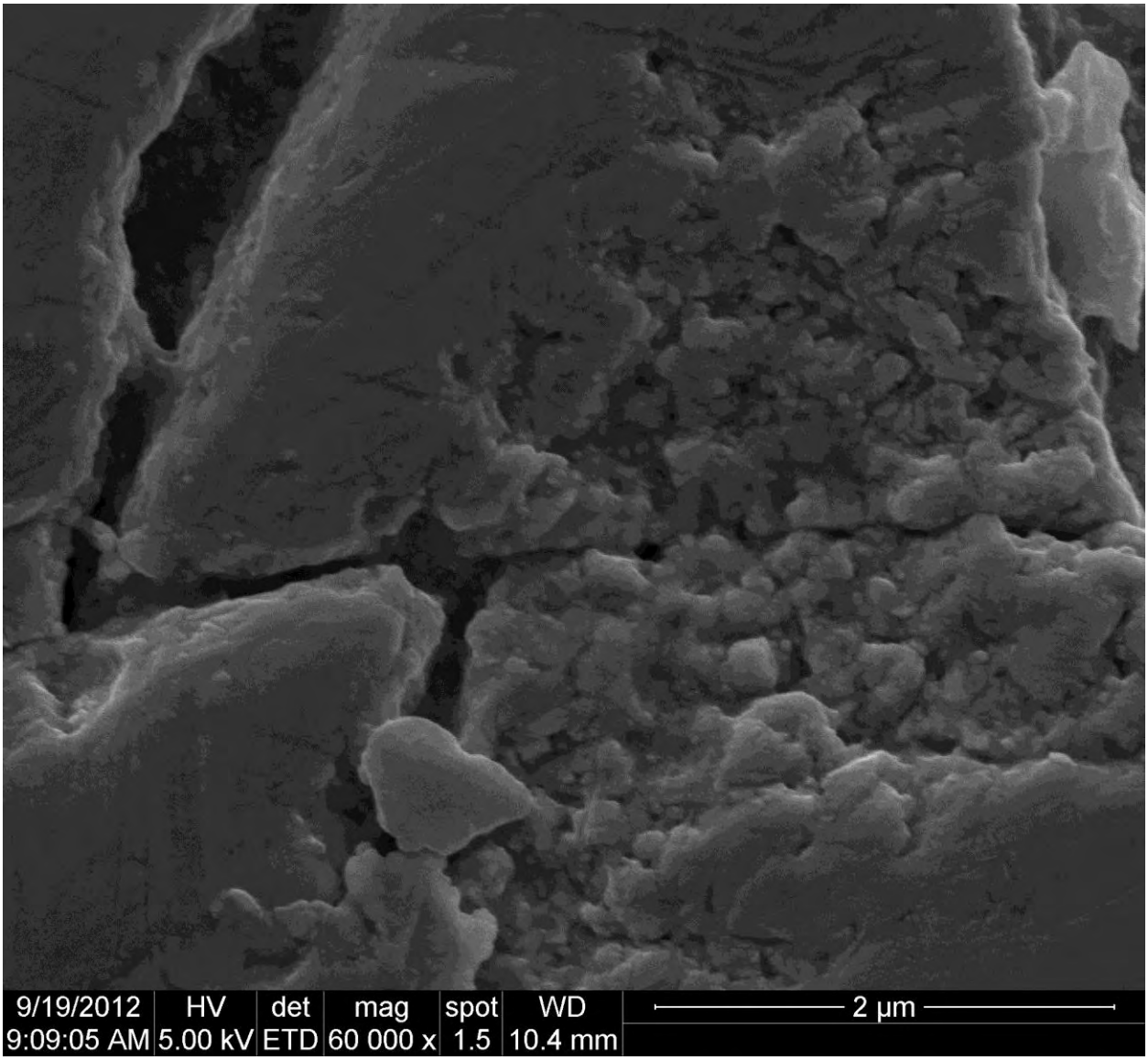
A.3-2: SEM image of pocket corrosion in the cross section of 316 Stainless Steel of EBS 3



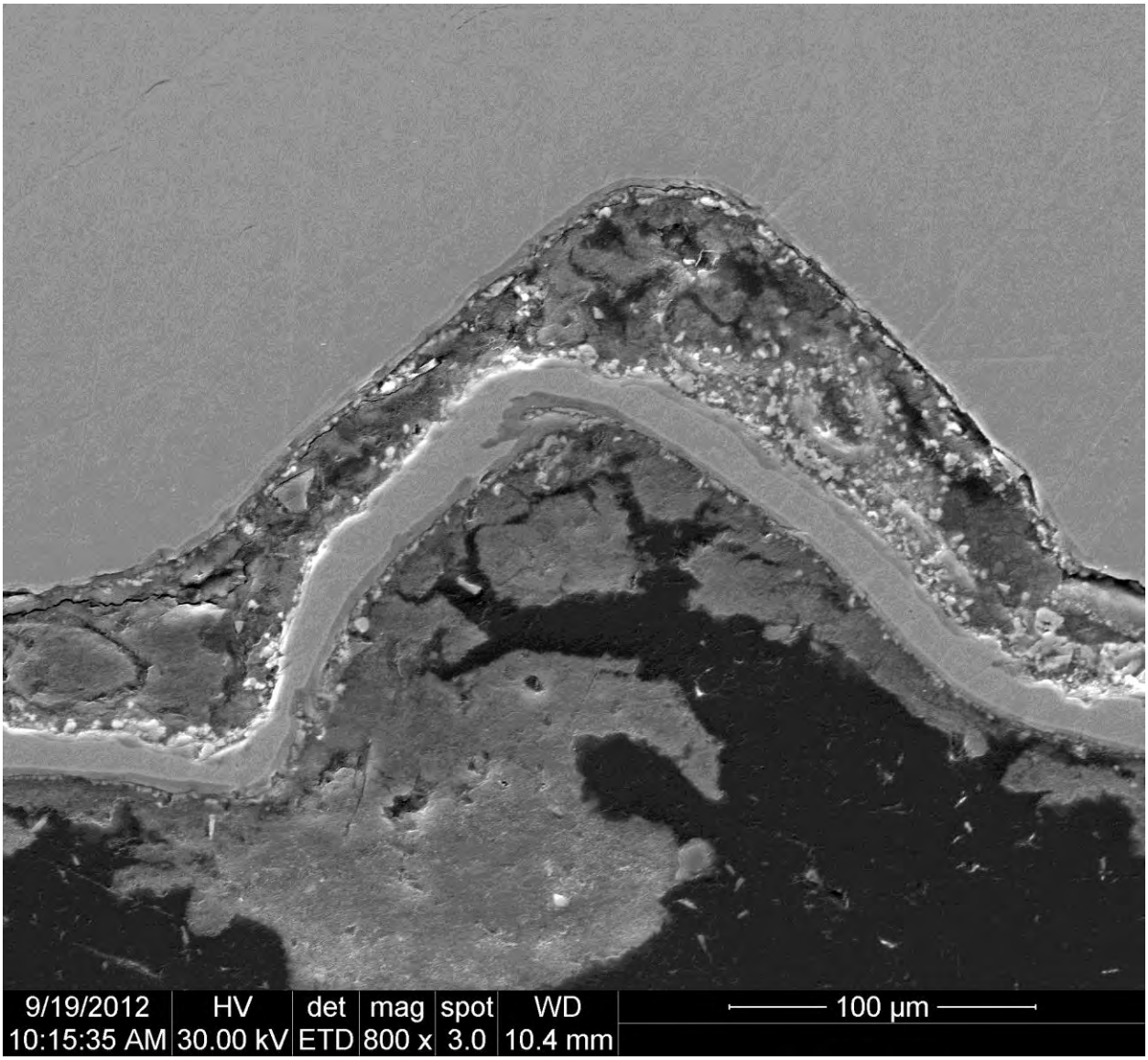
A.3-3: SEM Image of pocket corrosion close up on 316 Stainless Steel from EBS 3



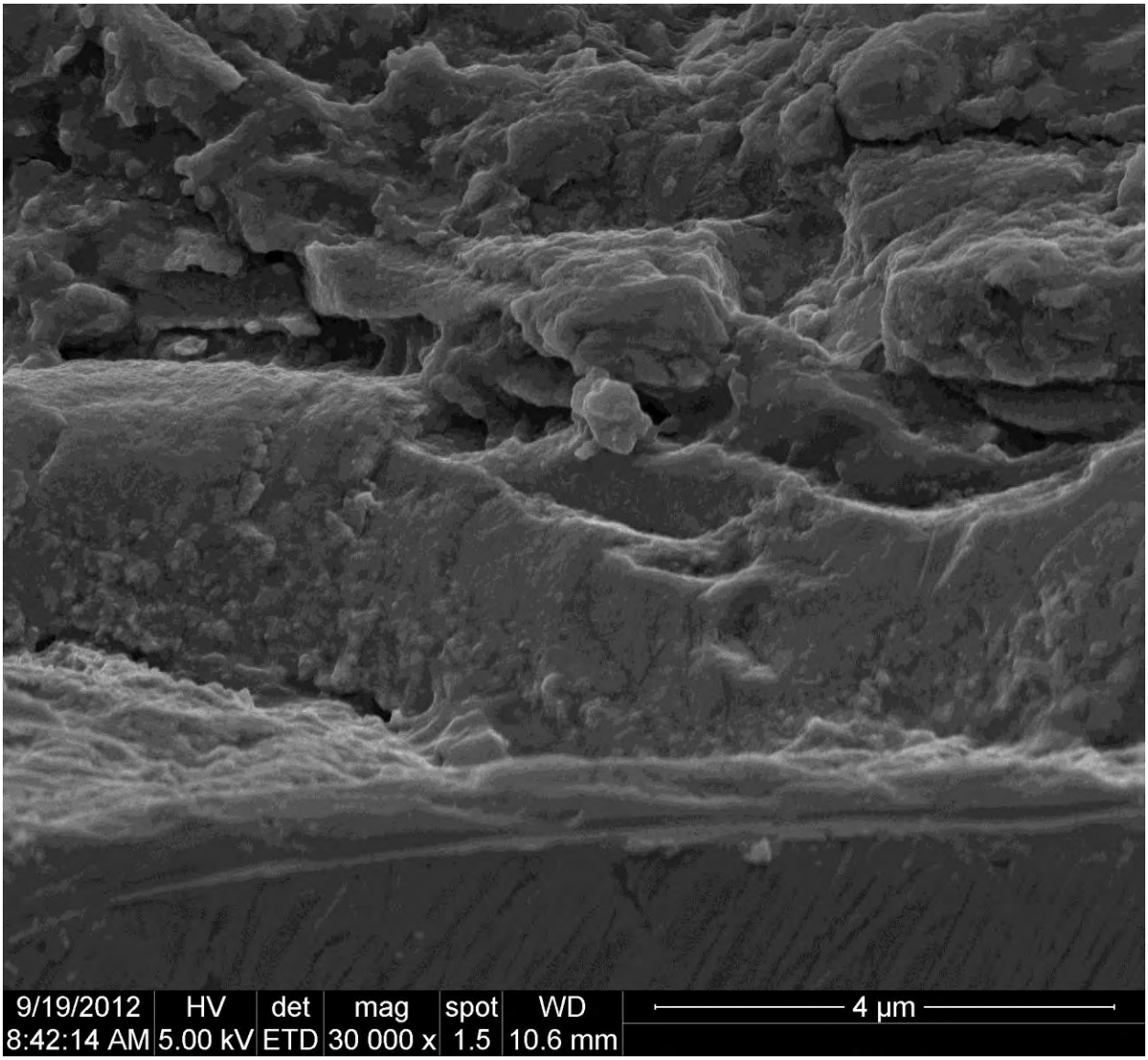
A.3-4: SEM image of crack corrosion in the cross section on 316 Stainless Steel from EBS 3



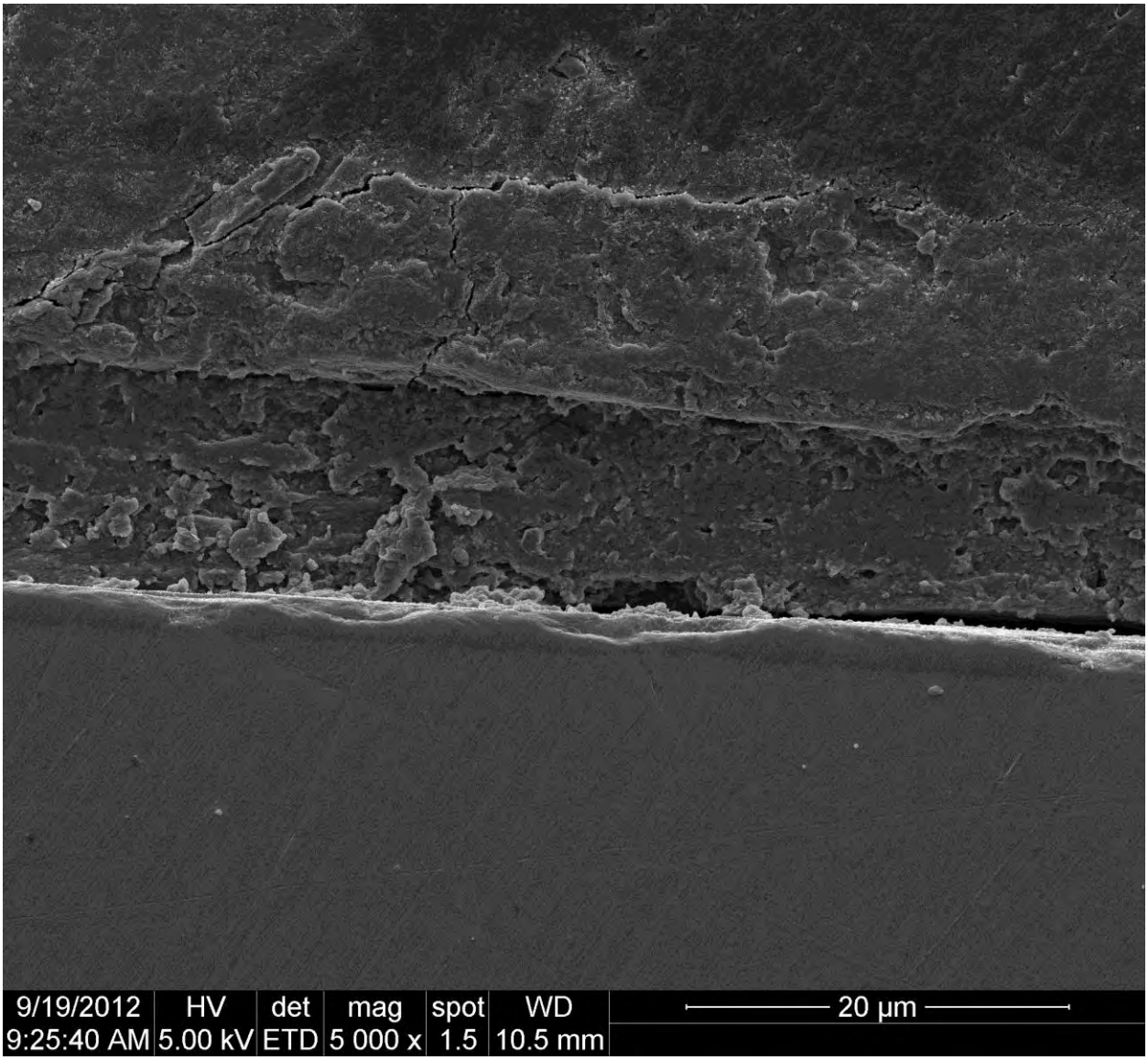
A.3-5: SEM image of alteration close up on the cross section of 316 Stainless Steel from EBS 3



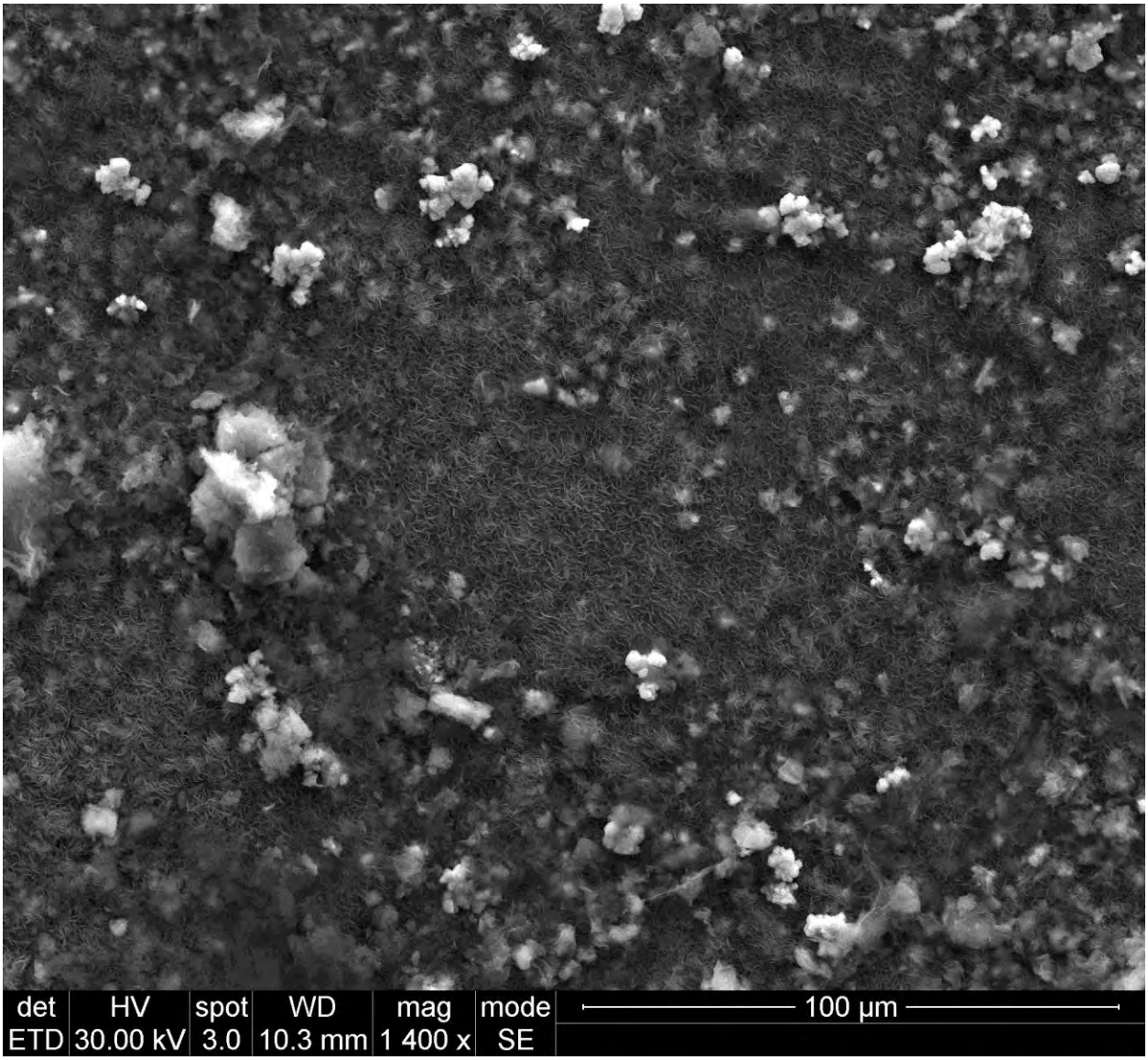
A.3-6: SEM image of cross section showing 316 Stainless Steel and saponite growth behind delaminated steel.



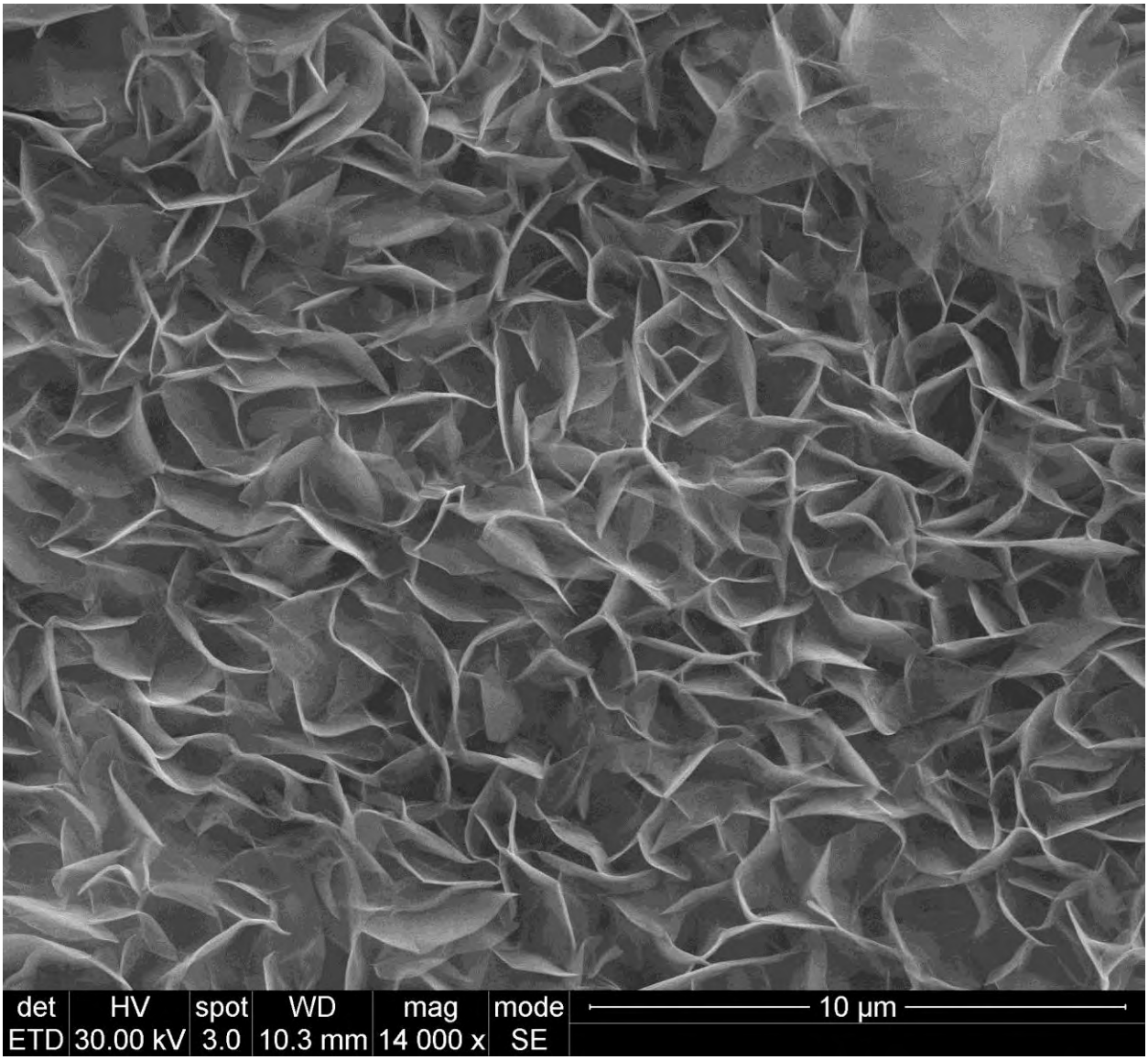
A.3-7: SEM image of Fe-saponitegrowth on 316 Stainless Steel. Steel is lower striated material. (cross section from EBS 3)



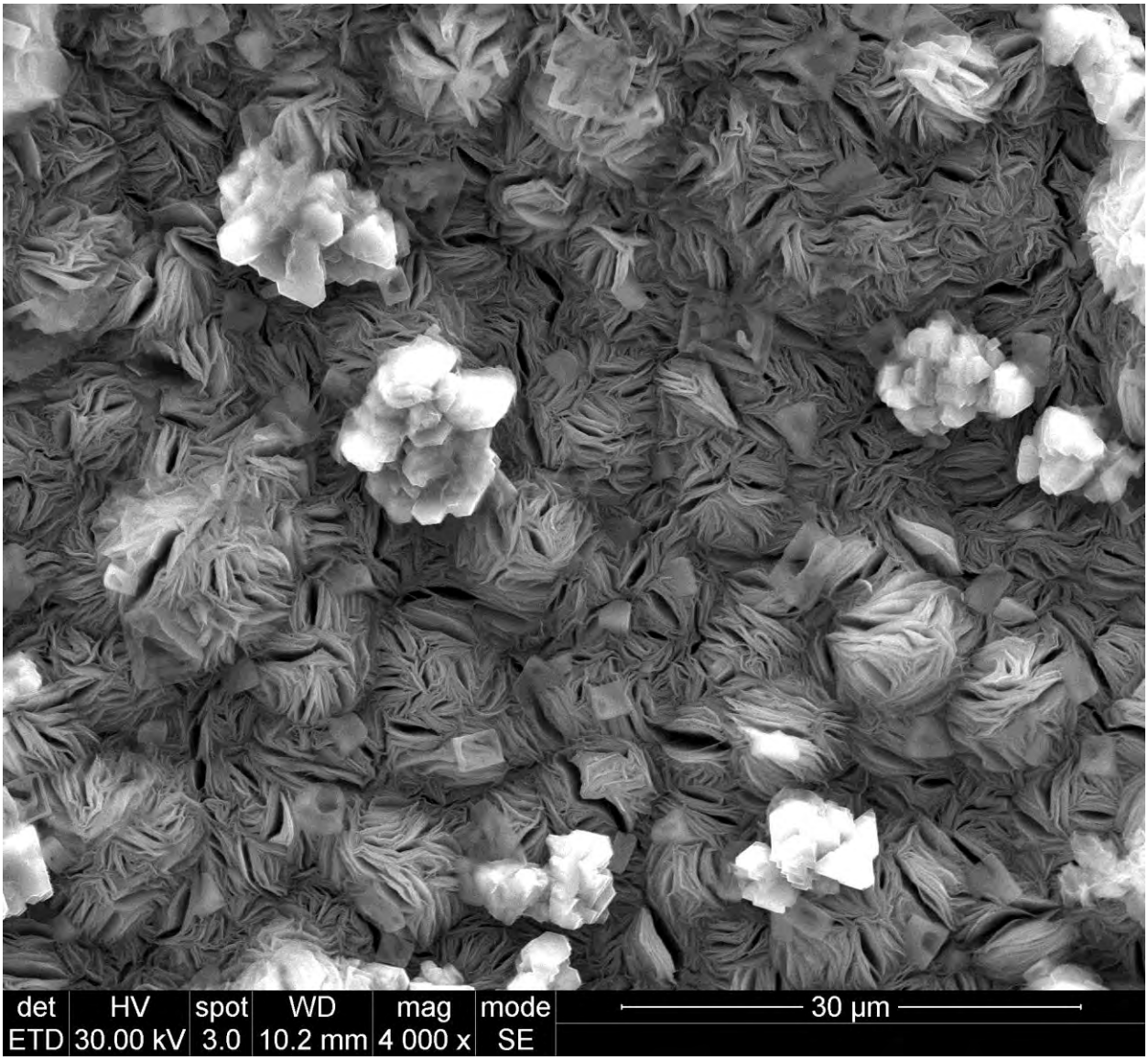
A.3-8: SEM Cross section image of 316 Stainless Steel and saponite from EBS 3



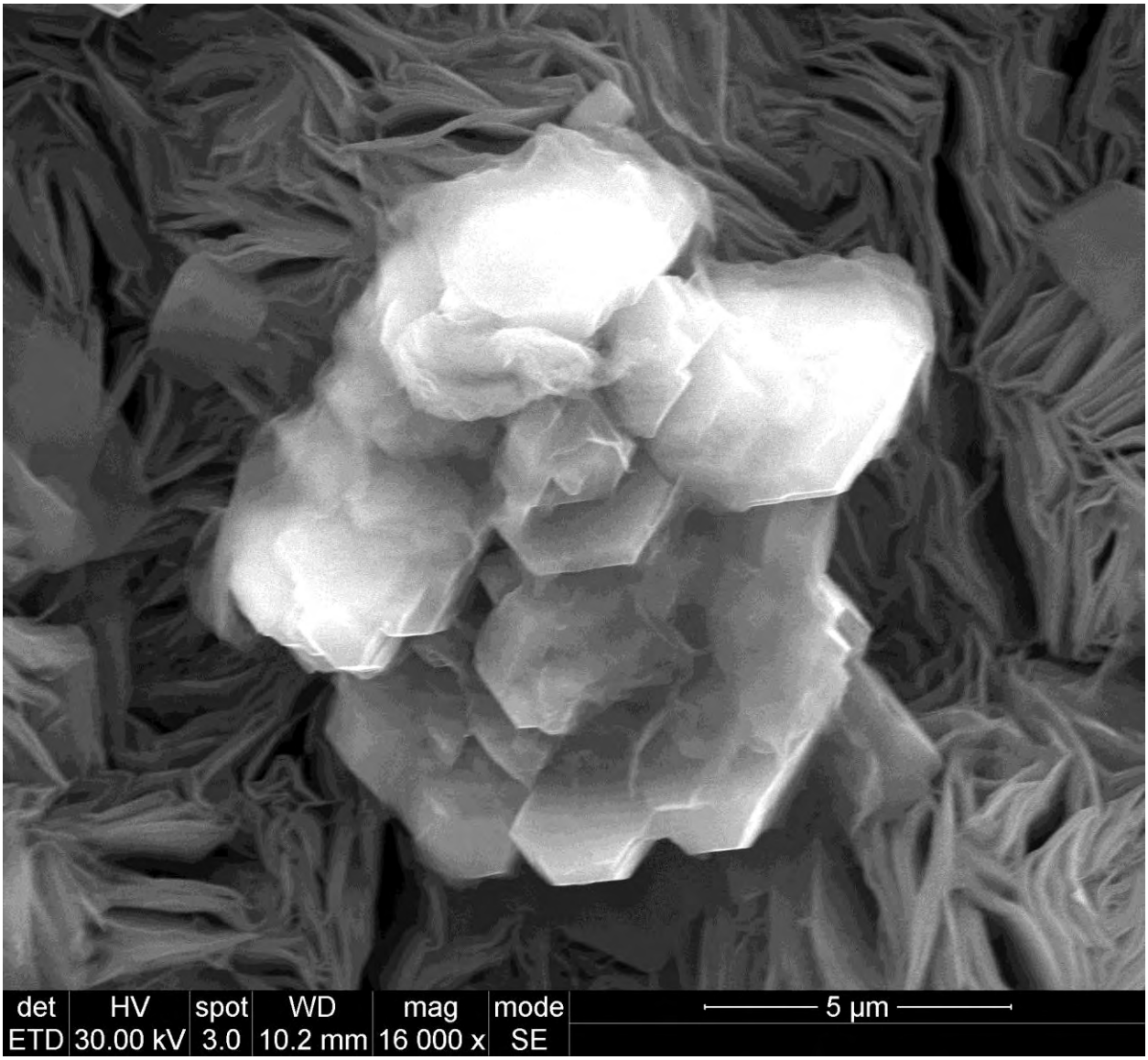
A.3-9. Low magnification SEM image of the surface of metal with Fe-saponite and pentlandite (white crystals) from EBS 3



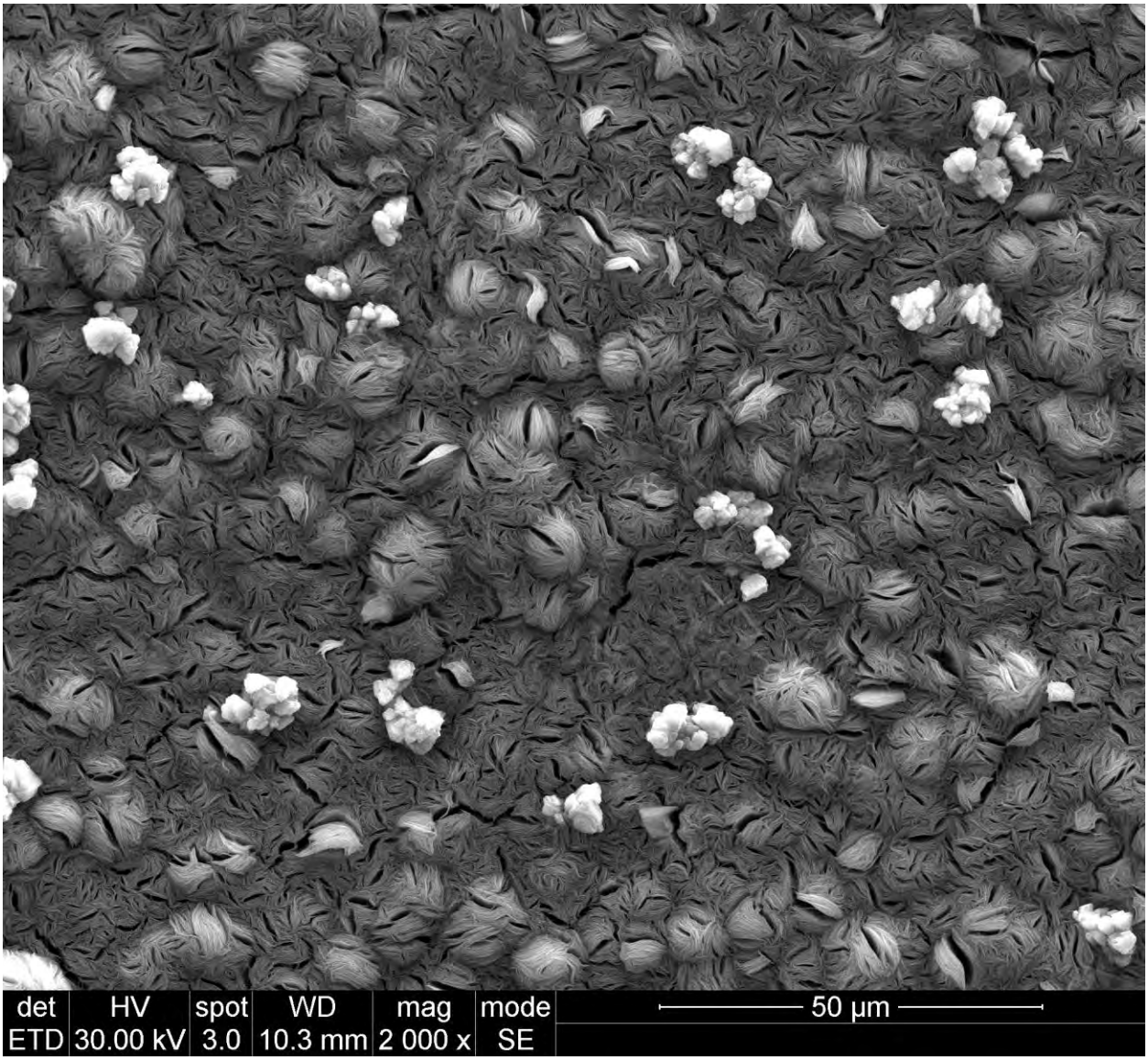
A.3-10. SEM image of smectite blades on 316 Stainless Steel (EBS 3)



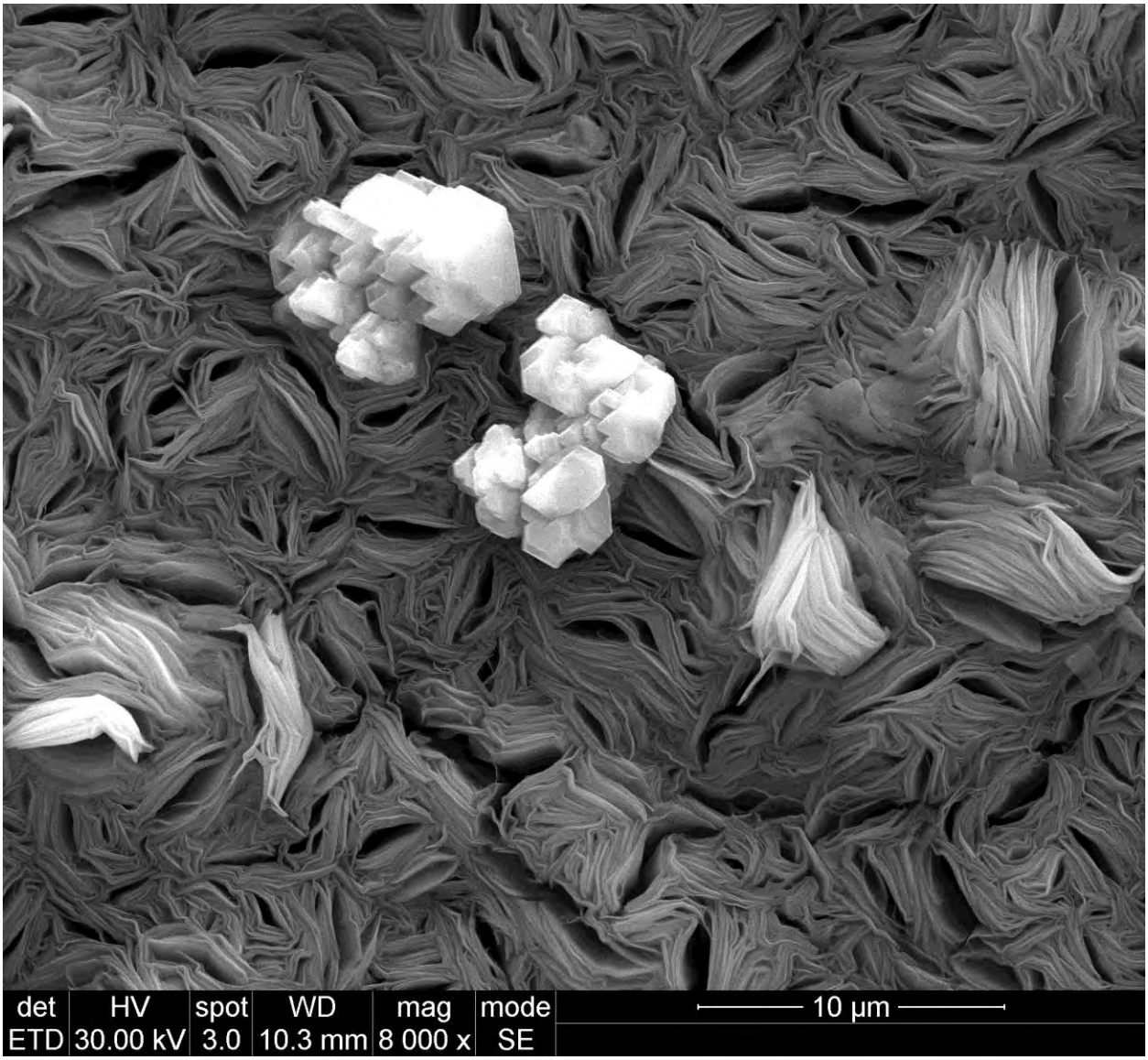
A.3-11. SEM image of pentlandite, Fe-saponite and halite on 316 Stainless Steel.



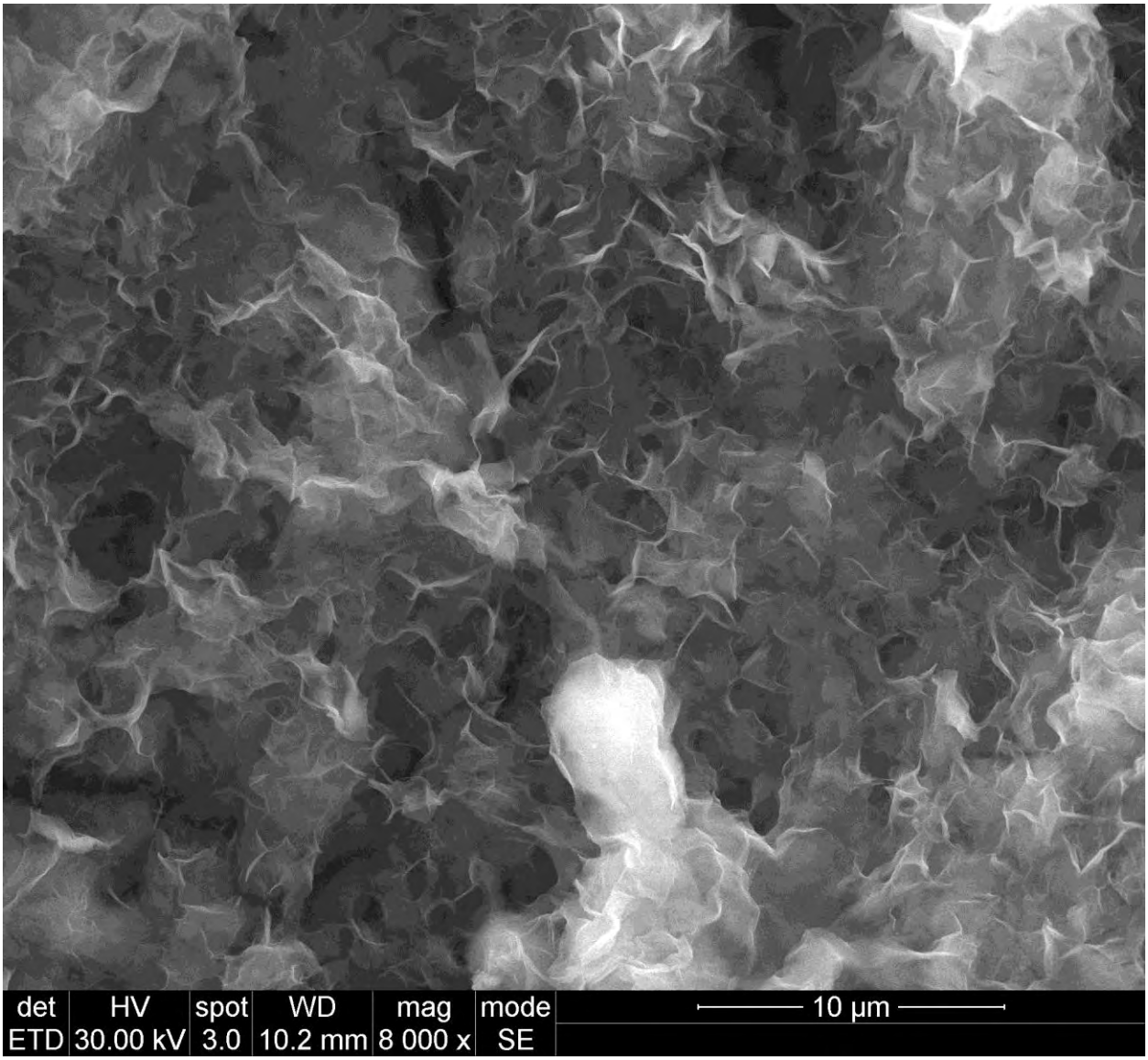
A.3-12. SEM image close up of pentlandite on 316 Stainless Steel



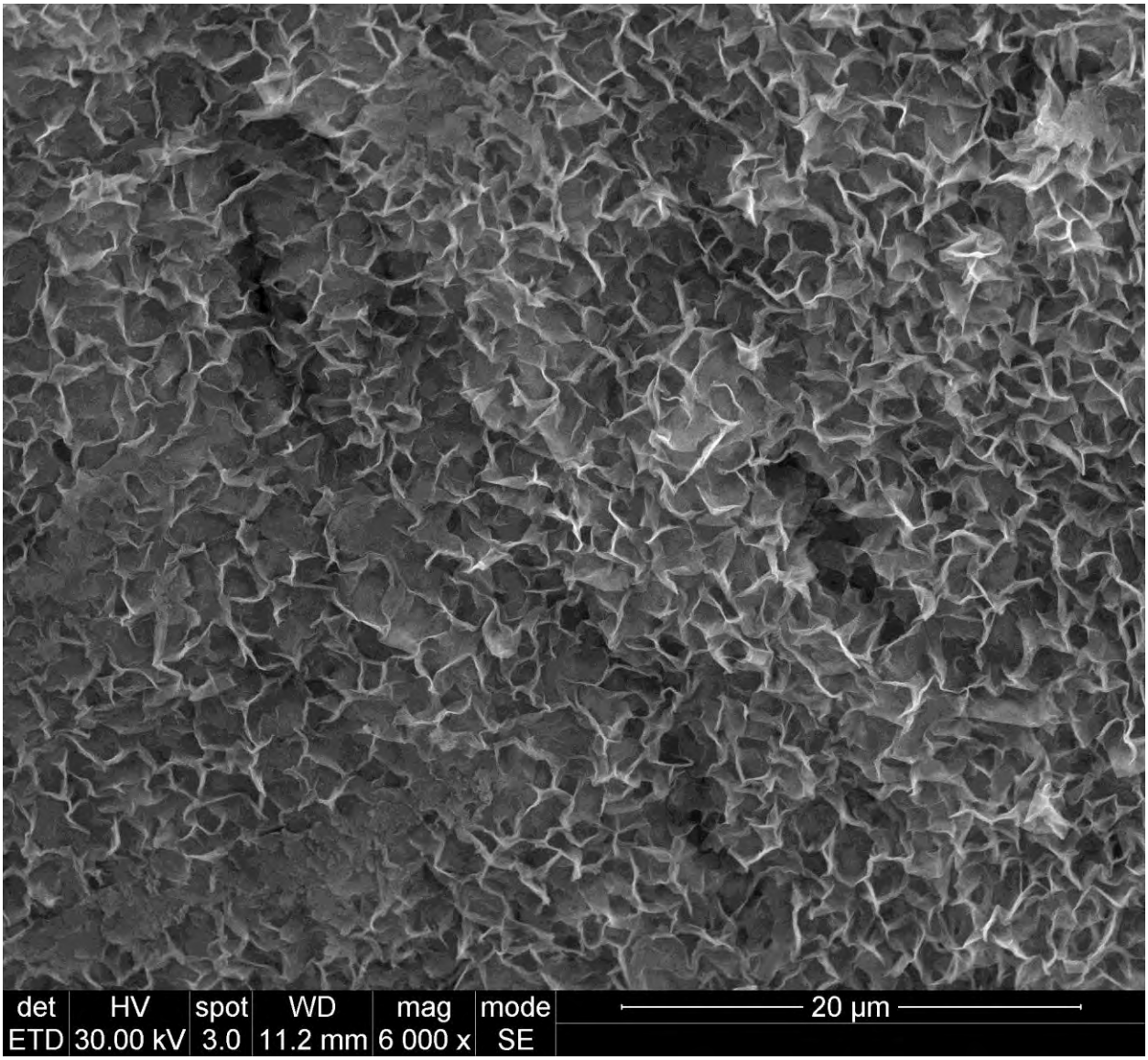
A.3-13. Wide field view SEM image of pentlandite and saponite



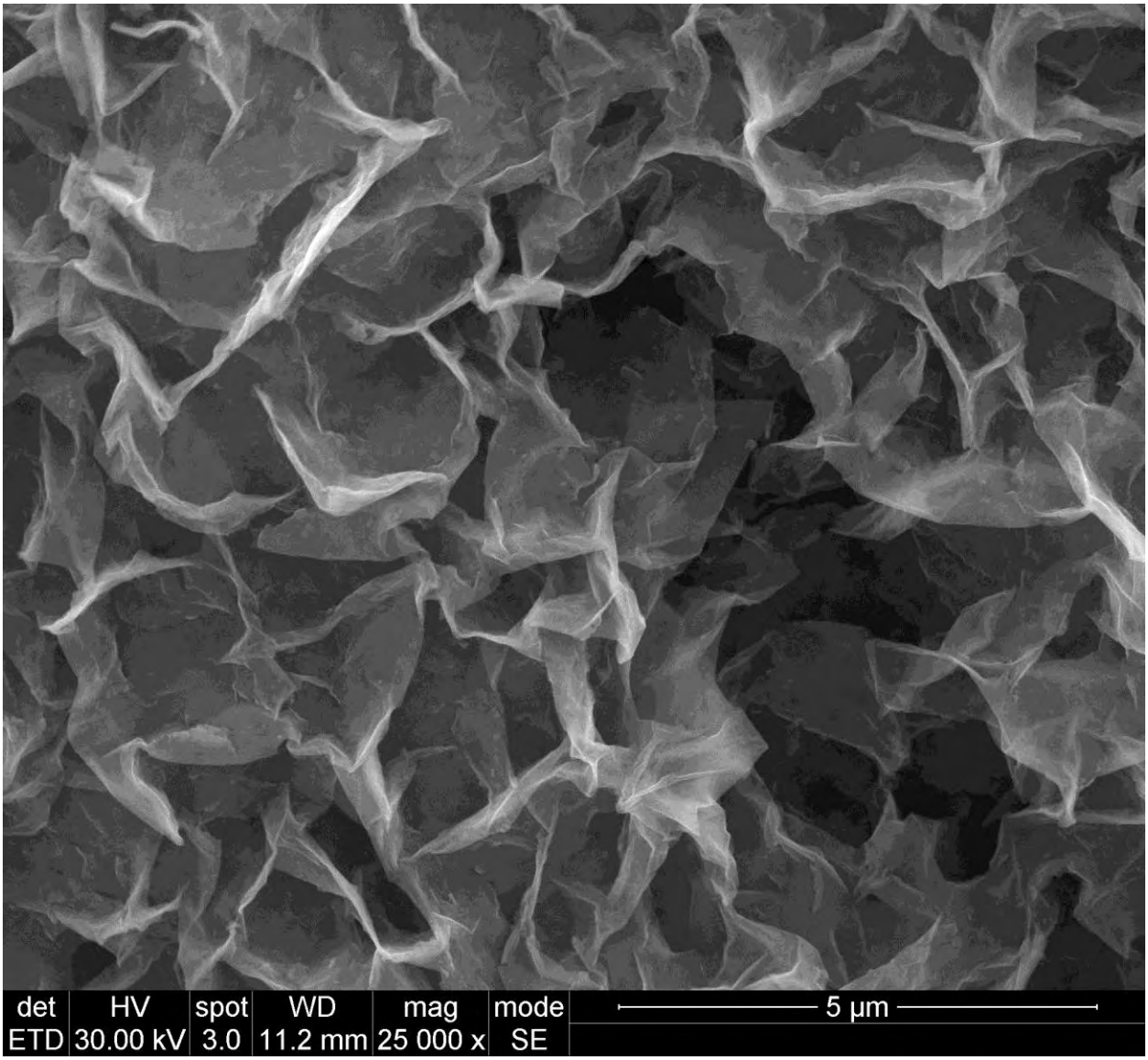
A.3-14. SEM image of Pentlandite and saponite on 316 Stainless Steel



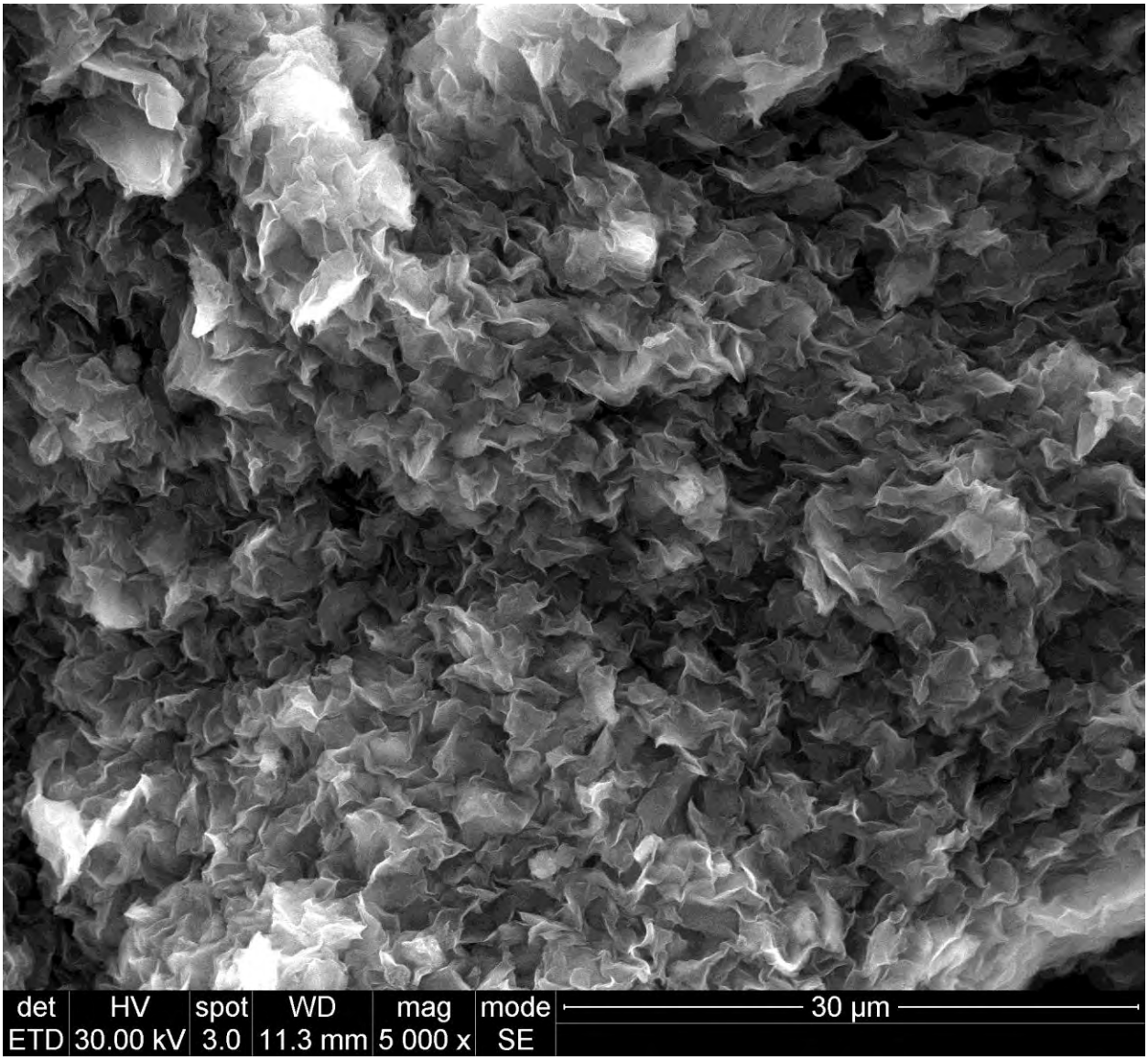
A.3-15. SEM image of smectite on 316 Stainless Steel



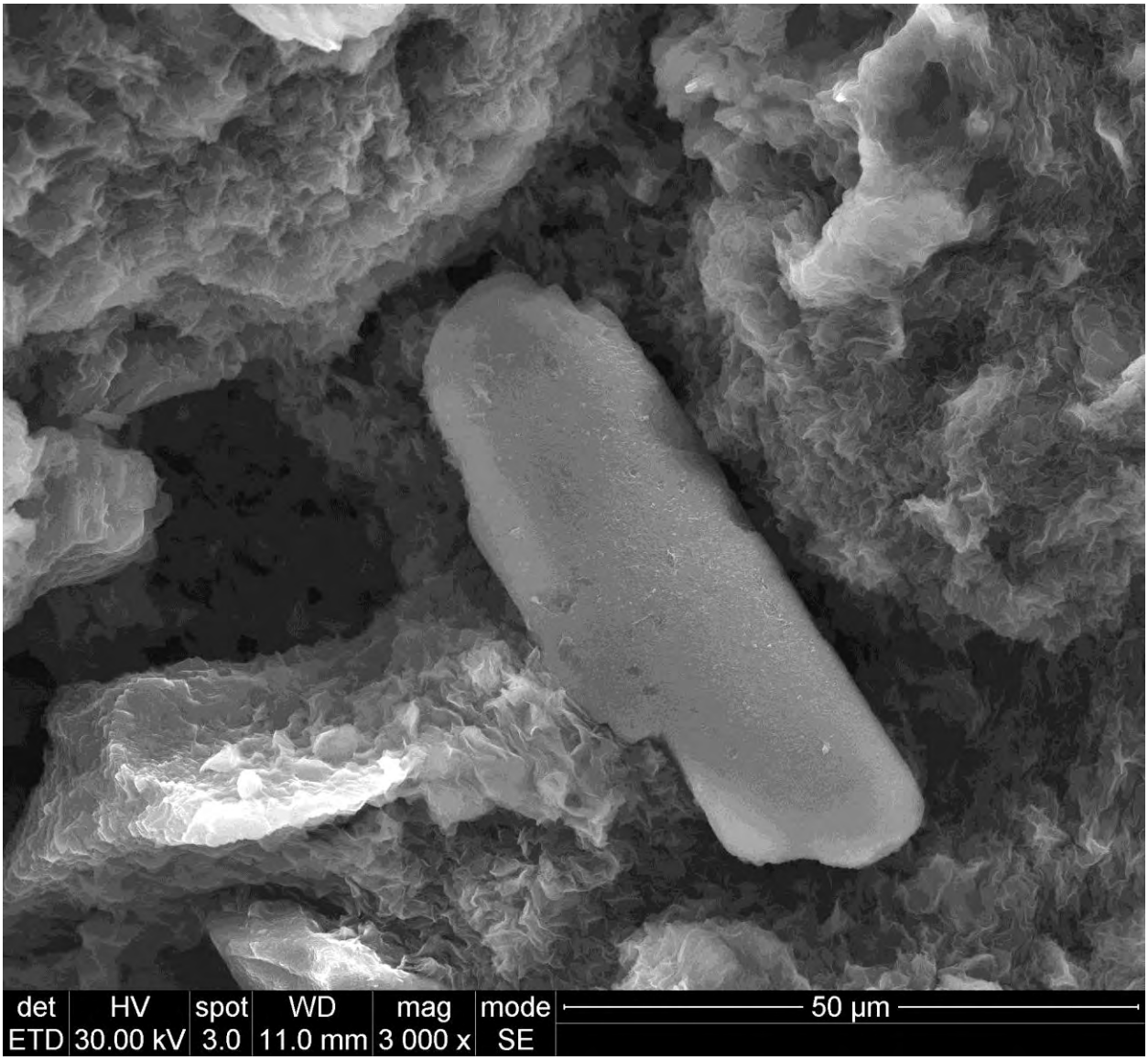
A.3-16. SEM image of smectite and underlying Fe-saponite on 316 Stainless Steel



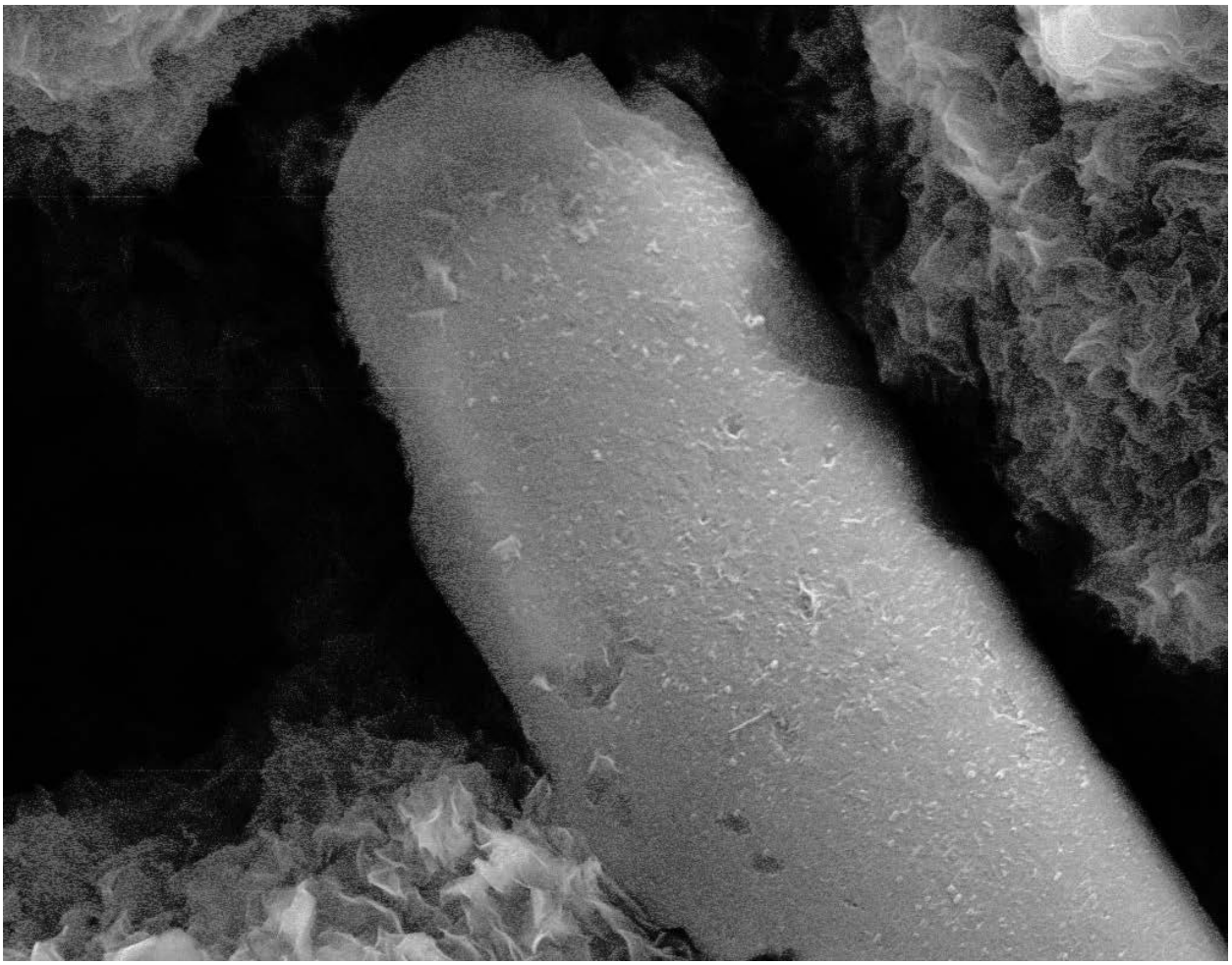
A.3-17. Close up SEM image of smectite



A.3-18. SEM image of smectite from EBS 3



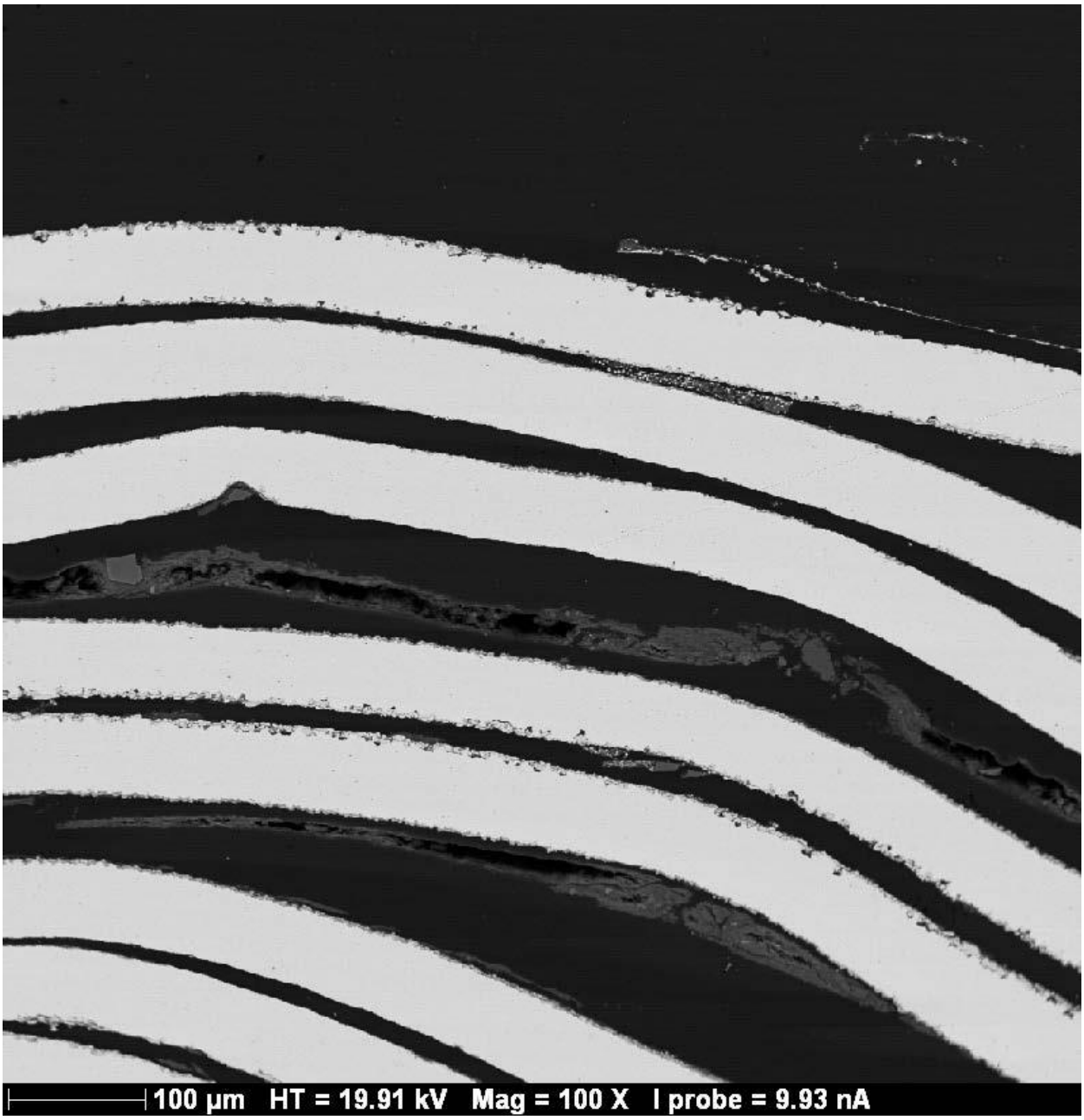
A.3-19. SEM image of corroded plagioclase phenocryst from EBS 3



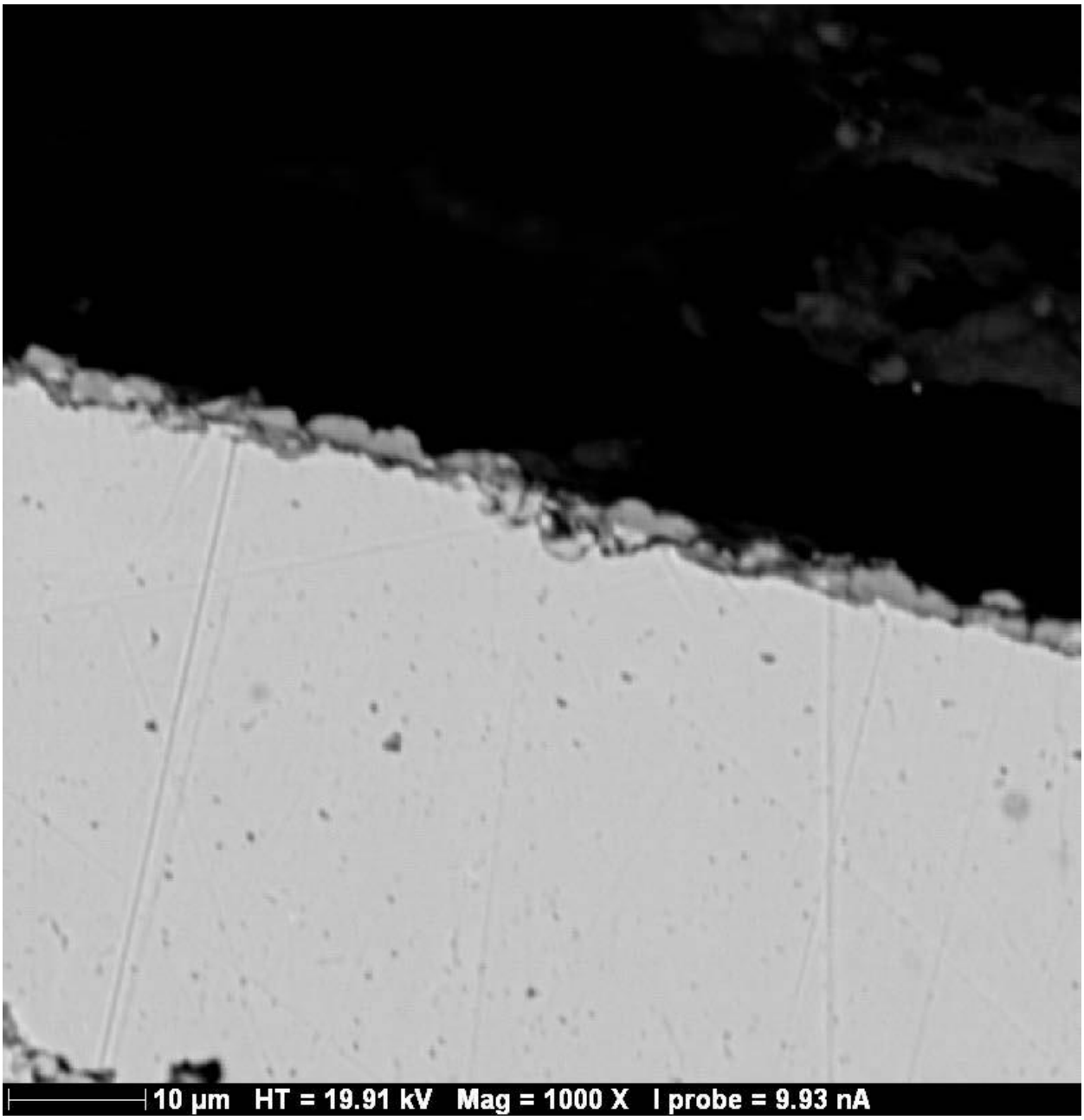
A.3-20 Close up of SEM image of corroded plagioclase phenocryst from EBS 3

Appendix A.4

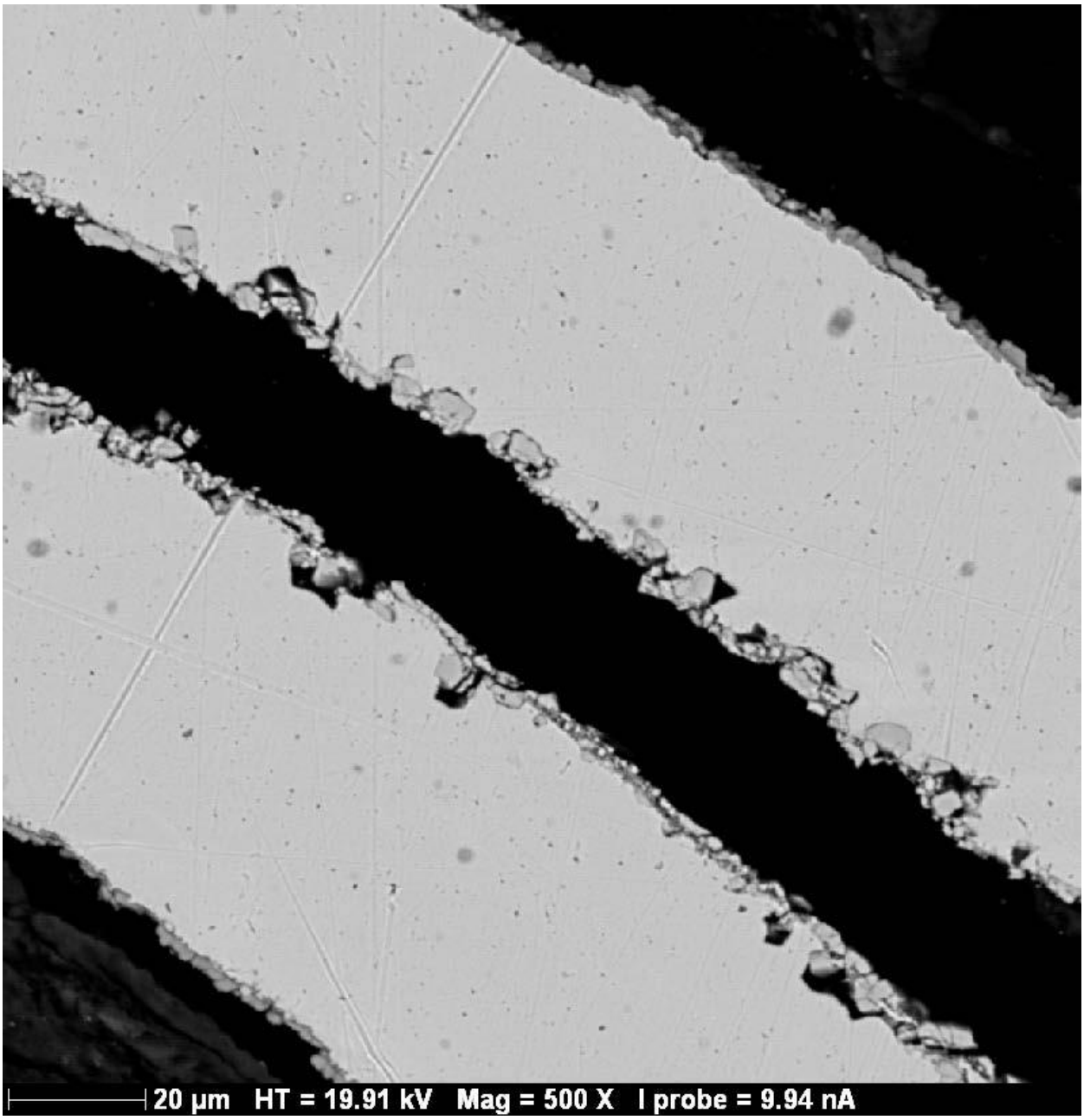
EBS 4 Step temperature increase at 150 bar for 5 weeks run with Copper



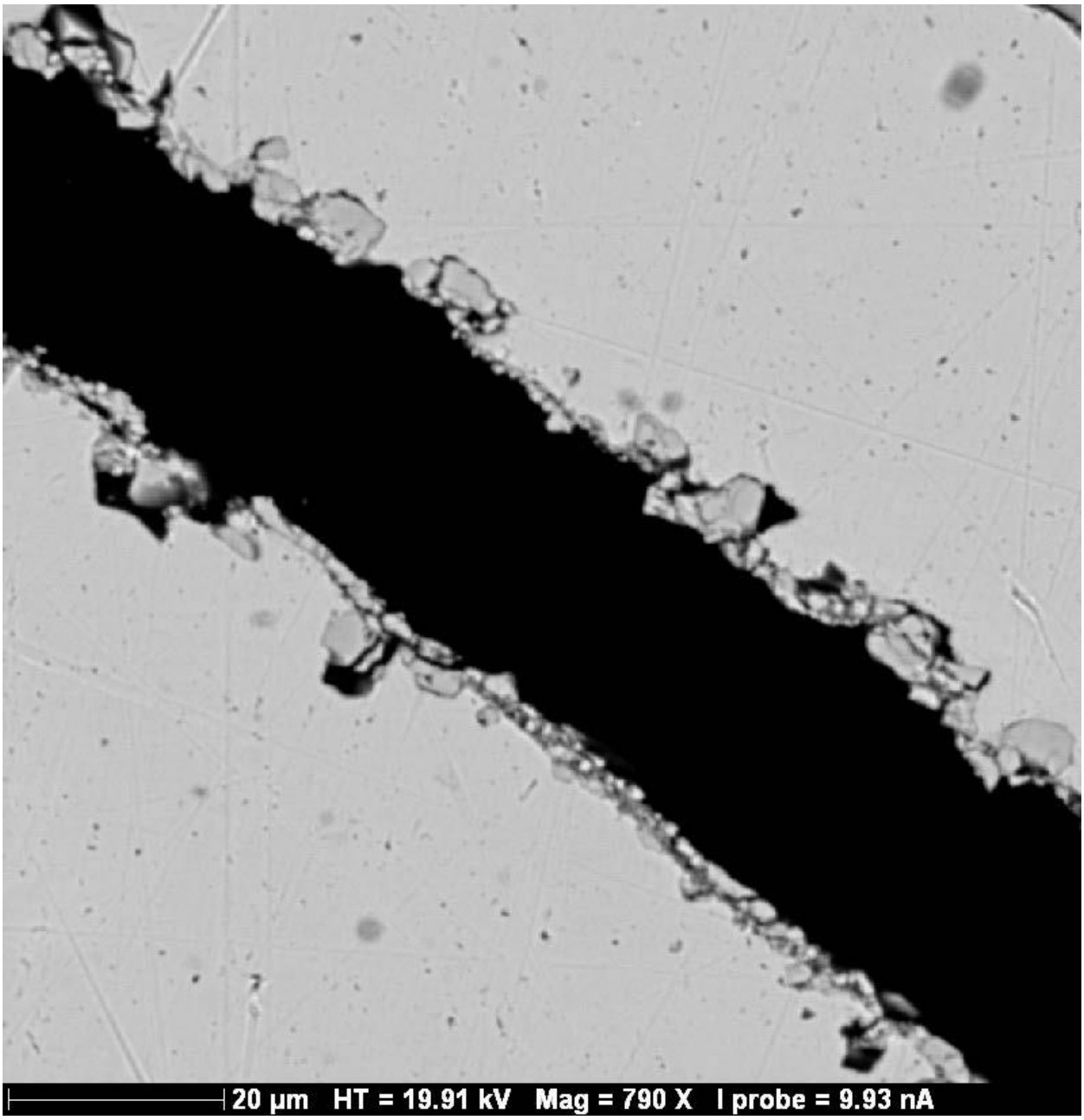
A.4-1: Back Scattered Electron image of EBS 4. Note pit corrosion on some, but not all outer edges of copper foil



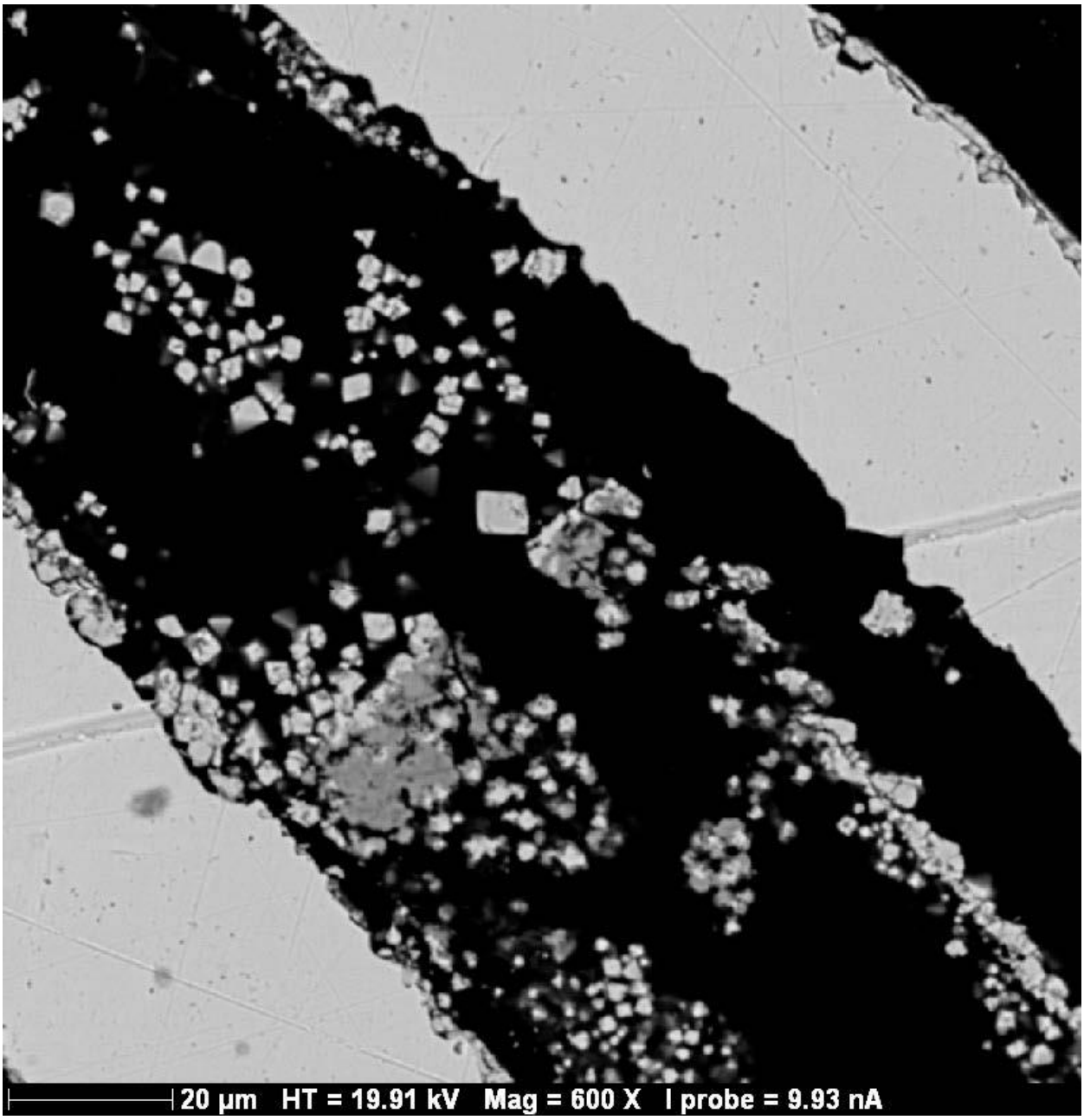
A.4-2: Back Scattered Electron image of chalcocite layer on copper



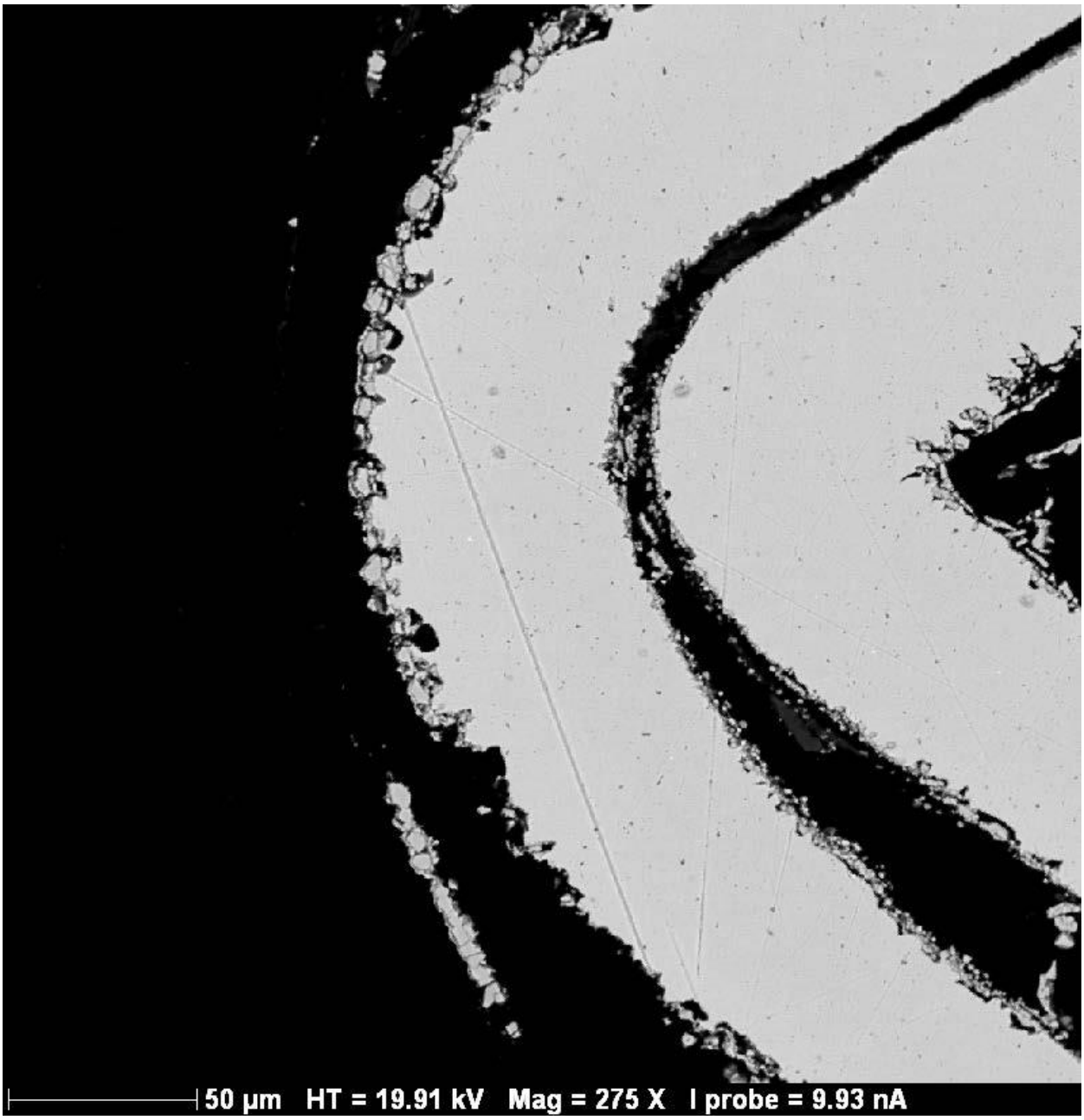
A.4-3: Back Scattered Electron image of chalcocite growing in copper pit corrosion crevices



A.4-4: Back Scattered Electron image of chalcocite growing in copper pit corrosion crevices

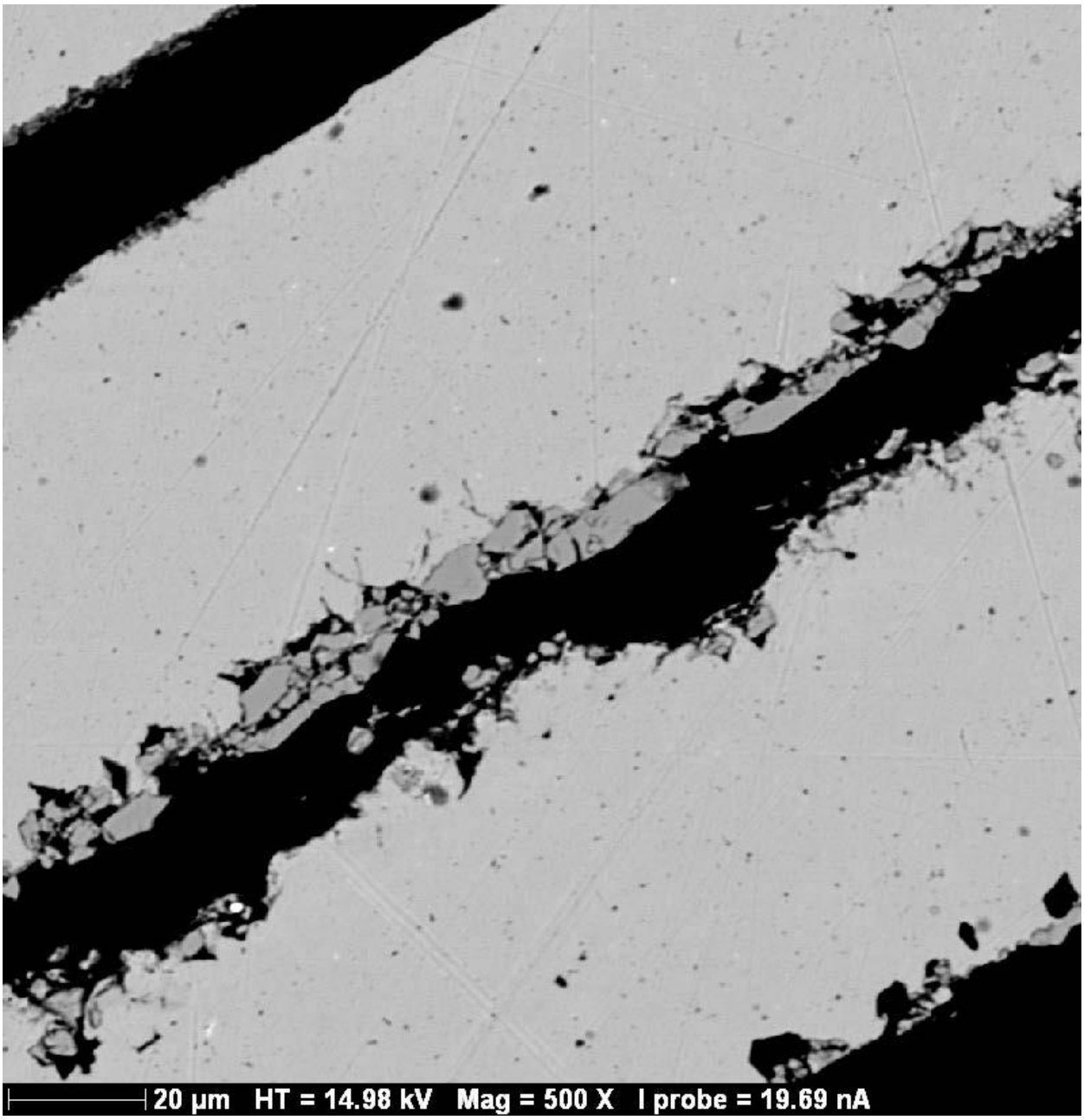


A.4-5: Back Scattered Electron image of chalcocite crystals growing between copper pit corrosion crevices

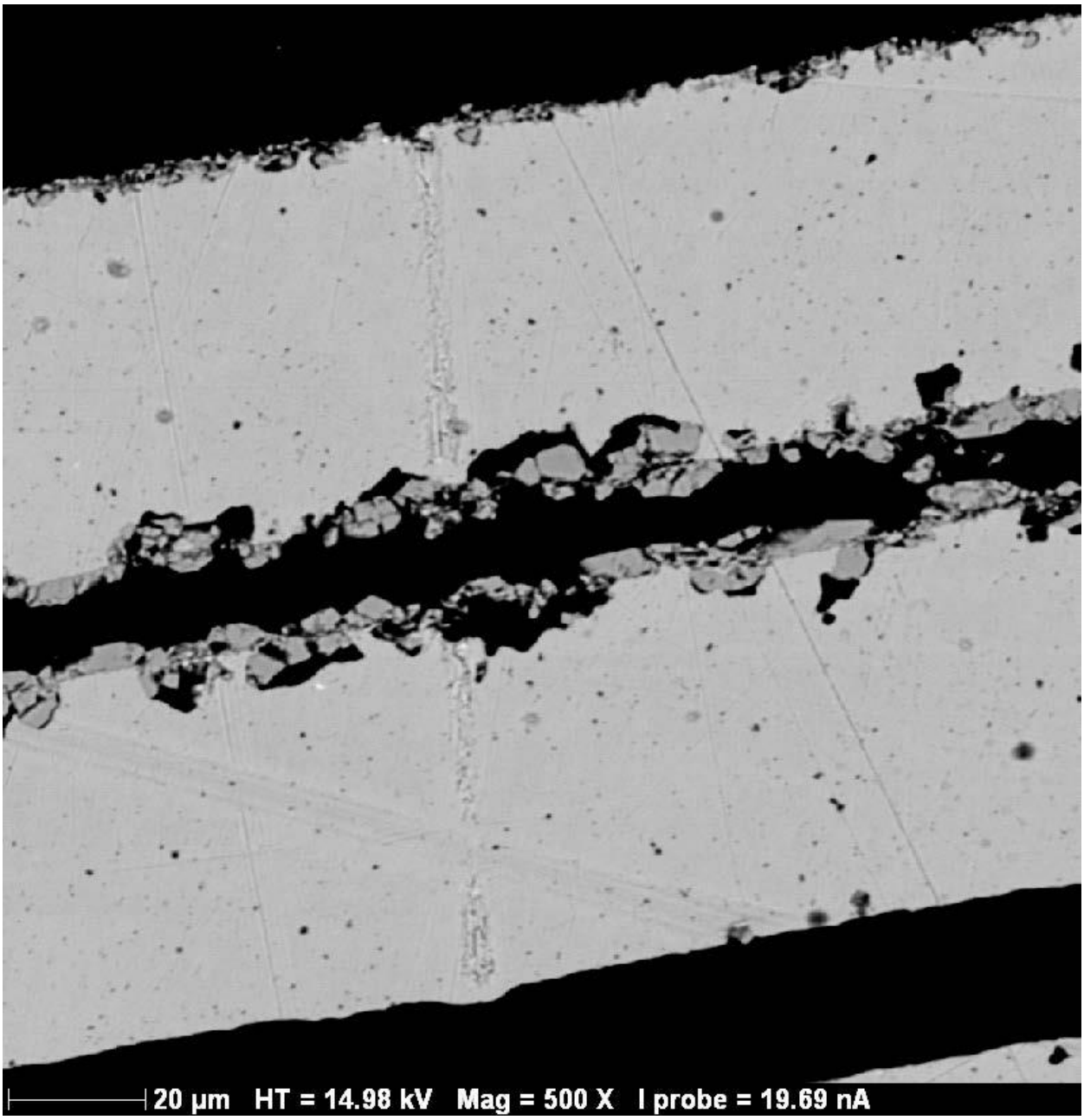


A.4-6: Back Scattered Electron image of chalcocite crystals growing over copper pit corrosion crevices

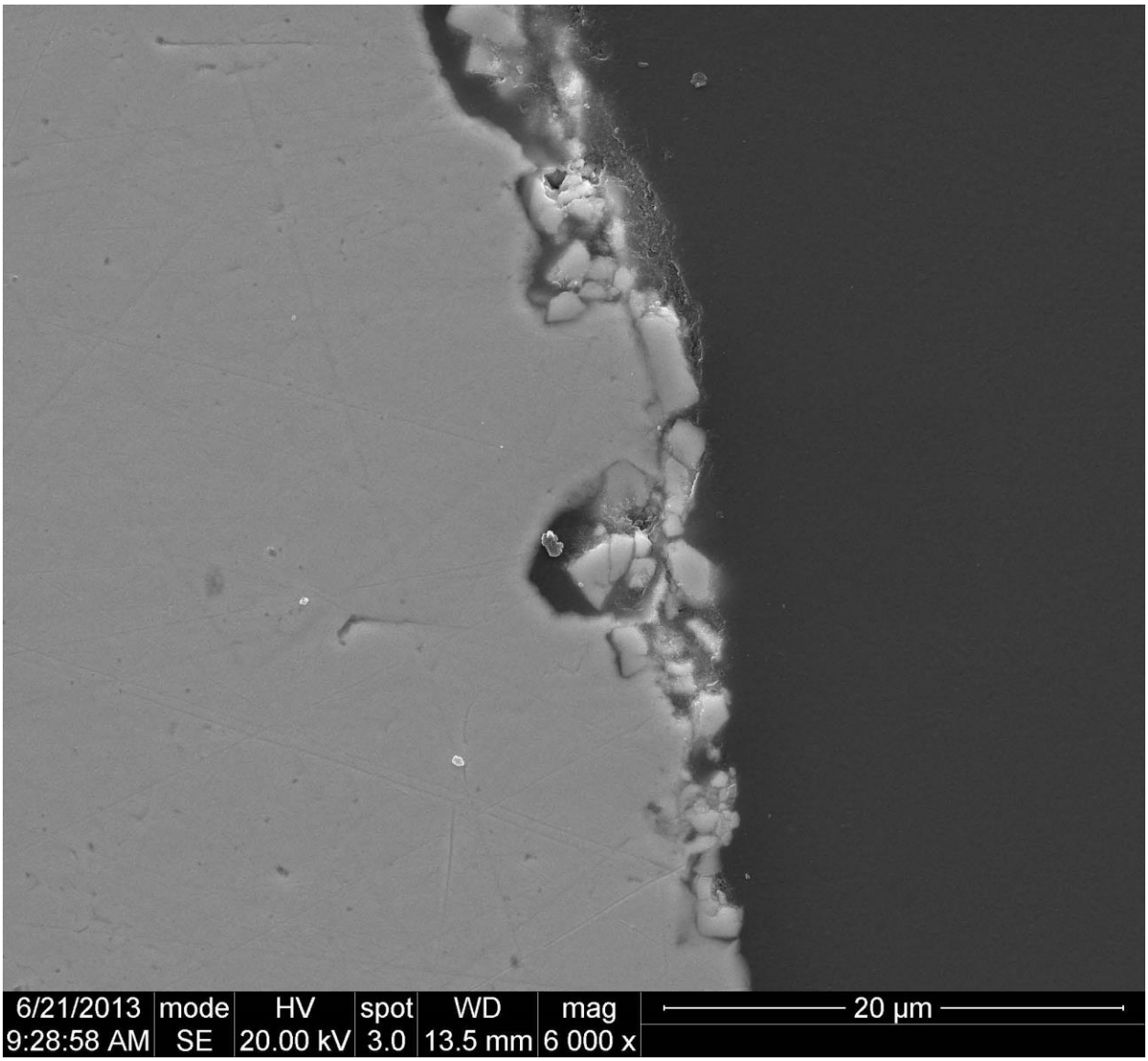
A.4-7: Back Scattered Electron image of chalcocite stringer of crystals



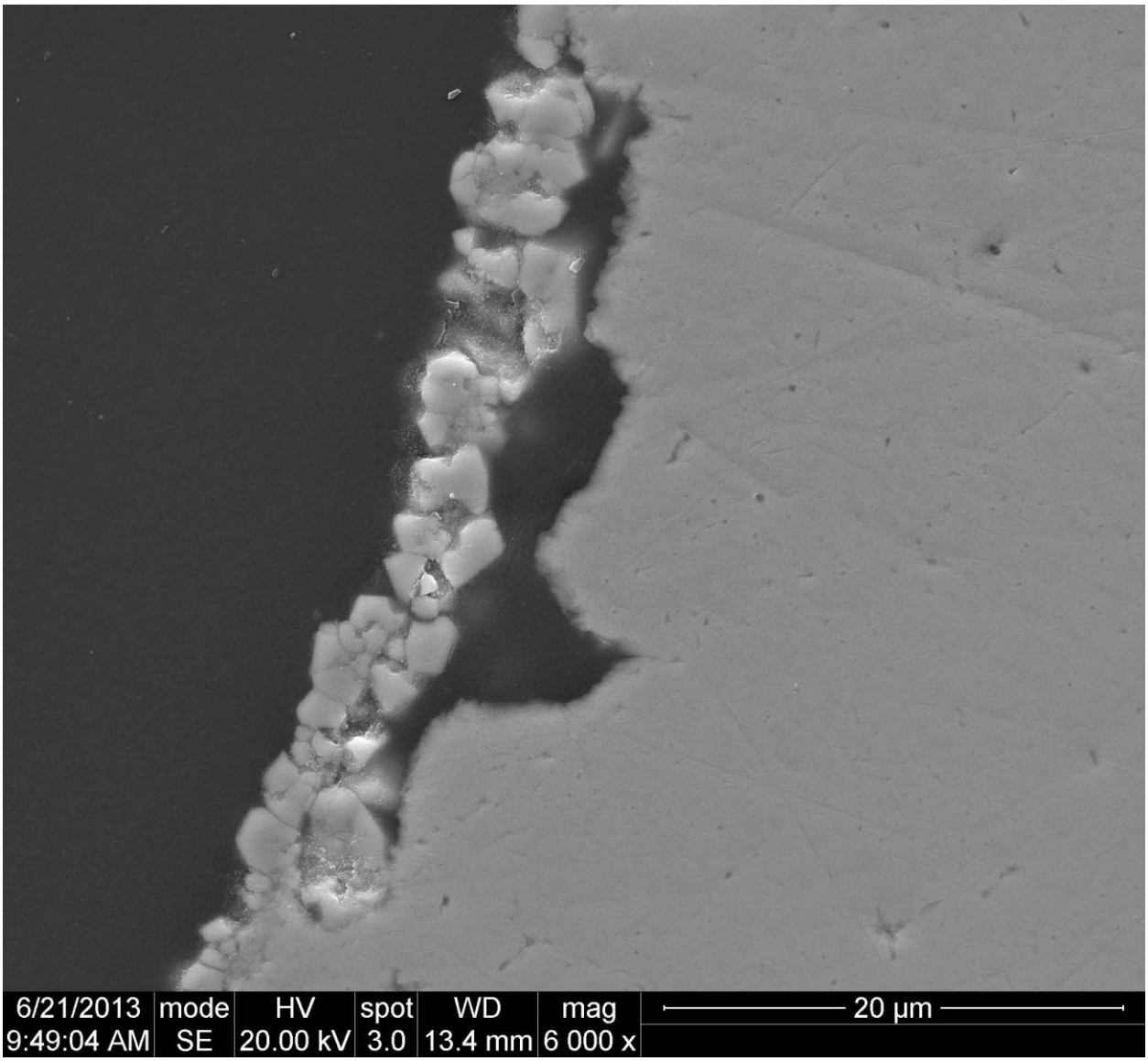
A.4-8: Back Scattered Electron image of chalcocite stringer of crystals on copper surface



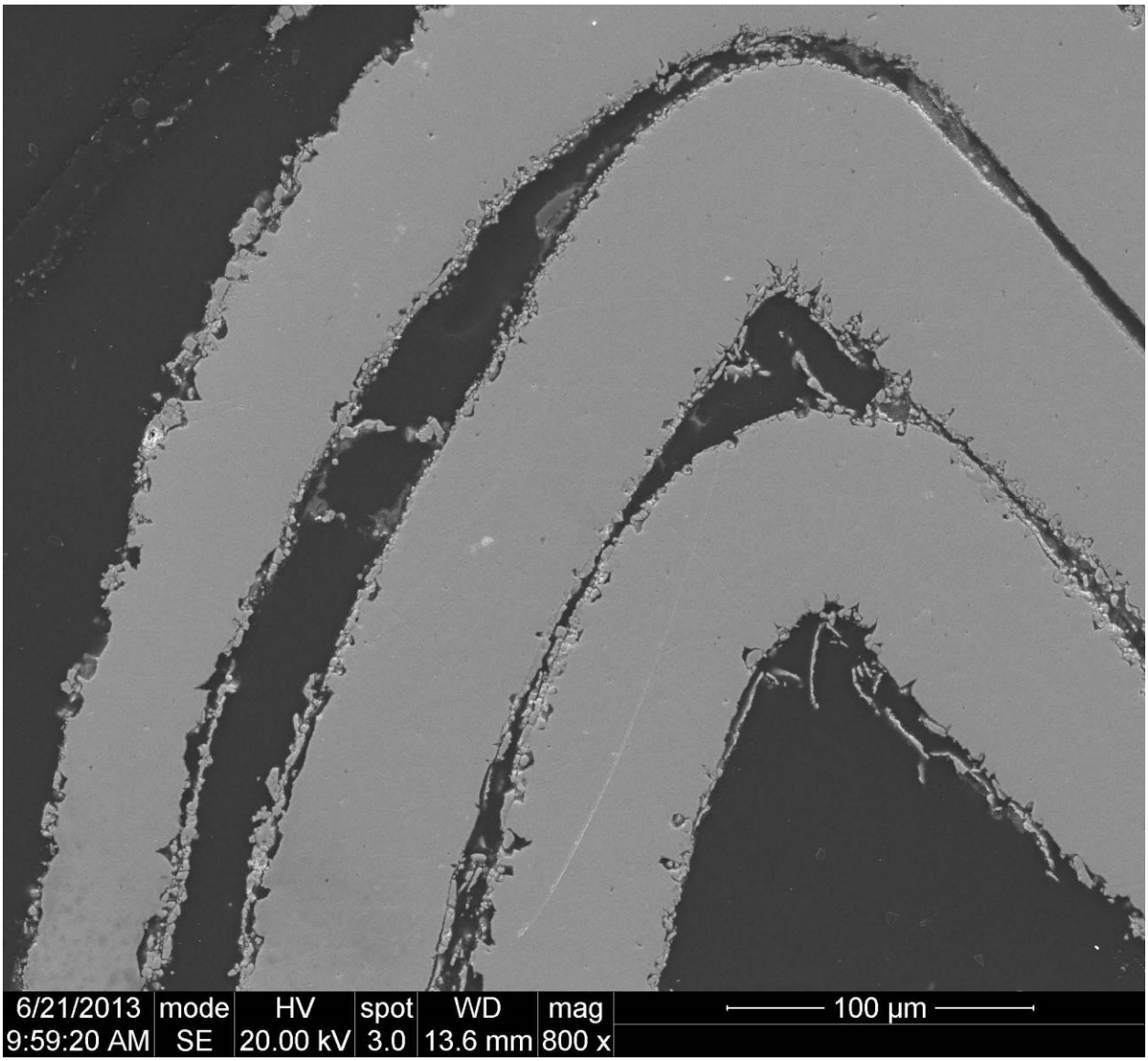
A.4-9: Back Scattered Electron image of chalcocite stringer of crystals on copper surface



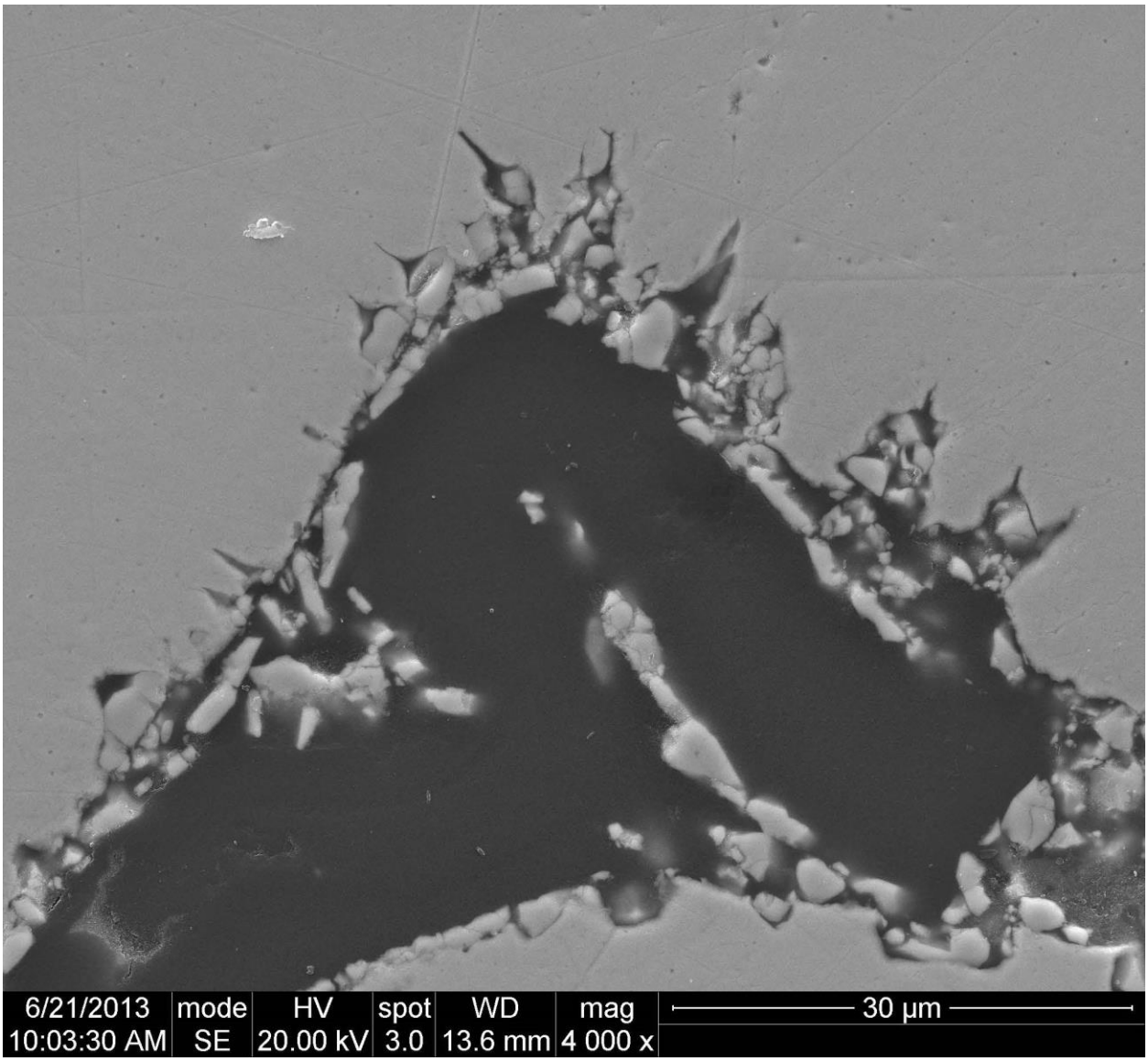
A.4-10: Back Scattered Electron image of chalcocite stringer of crystals on copper surface and filling pit corrosion pocket



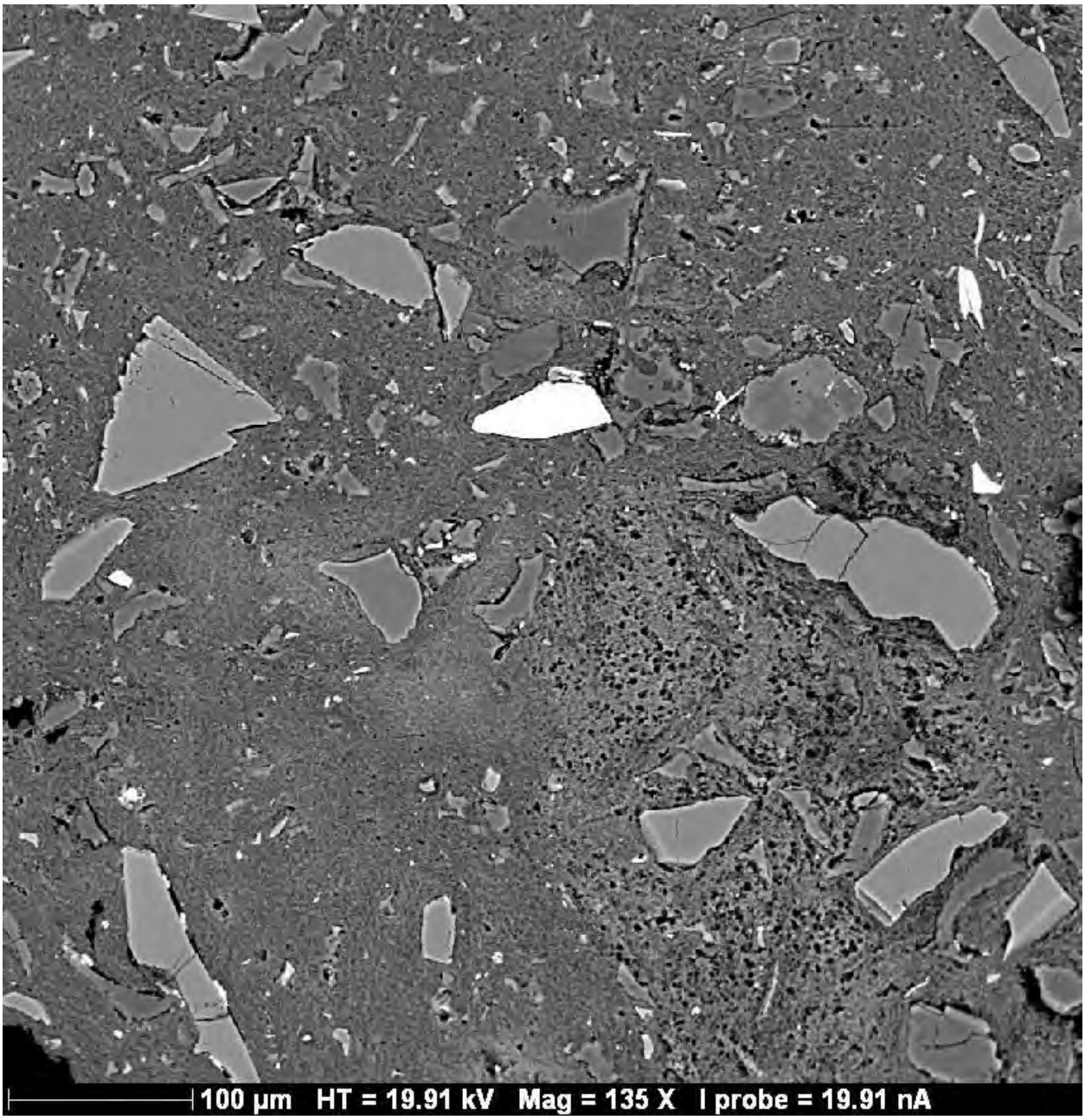
A.4-11: Back Scattered Electron image of chalcocite stringer of crystals bridging pit corrosion pocket



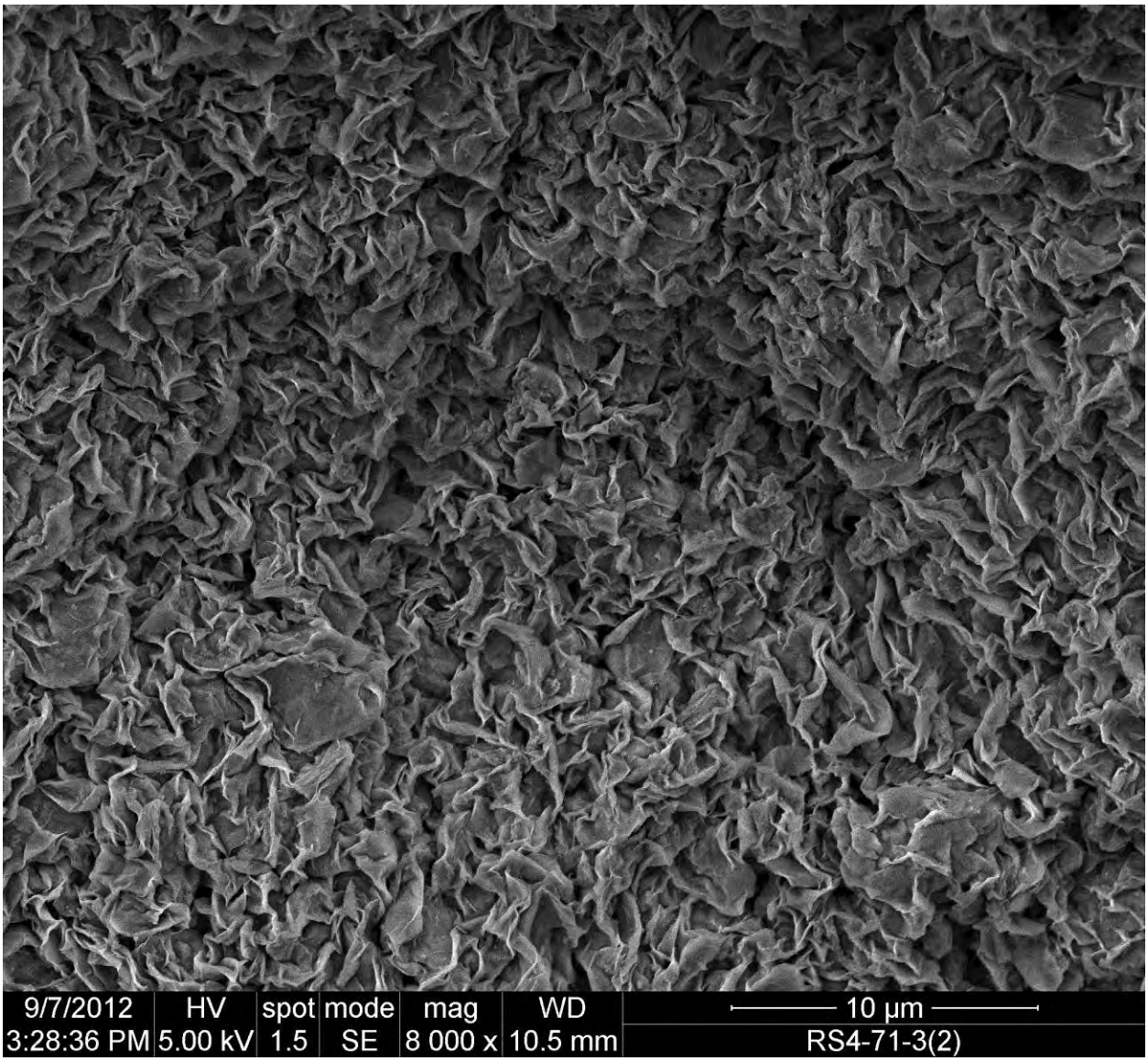
A.4-12: Back Scattered Electron image of chalcocite stringer of crystals on copper surface and filling pit corrosion pocket



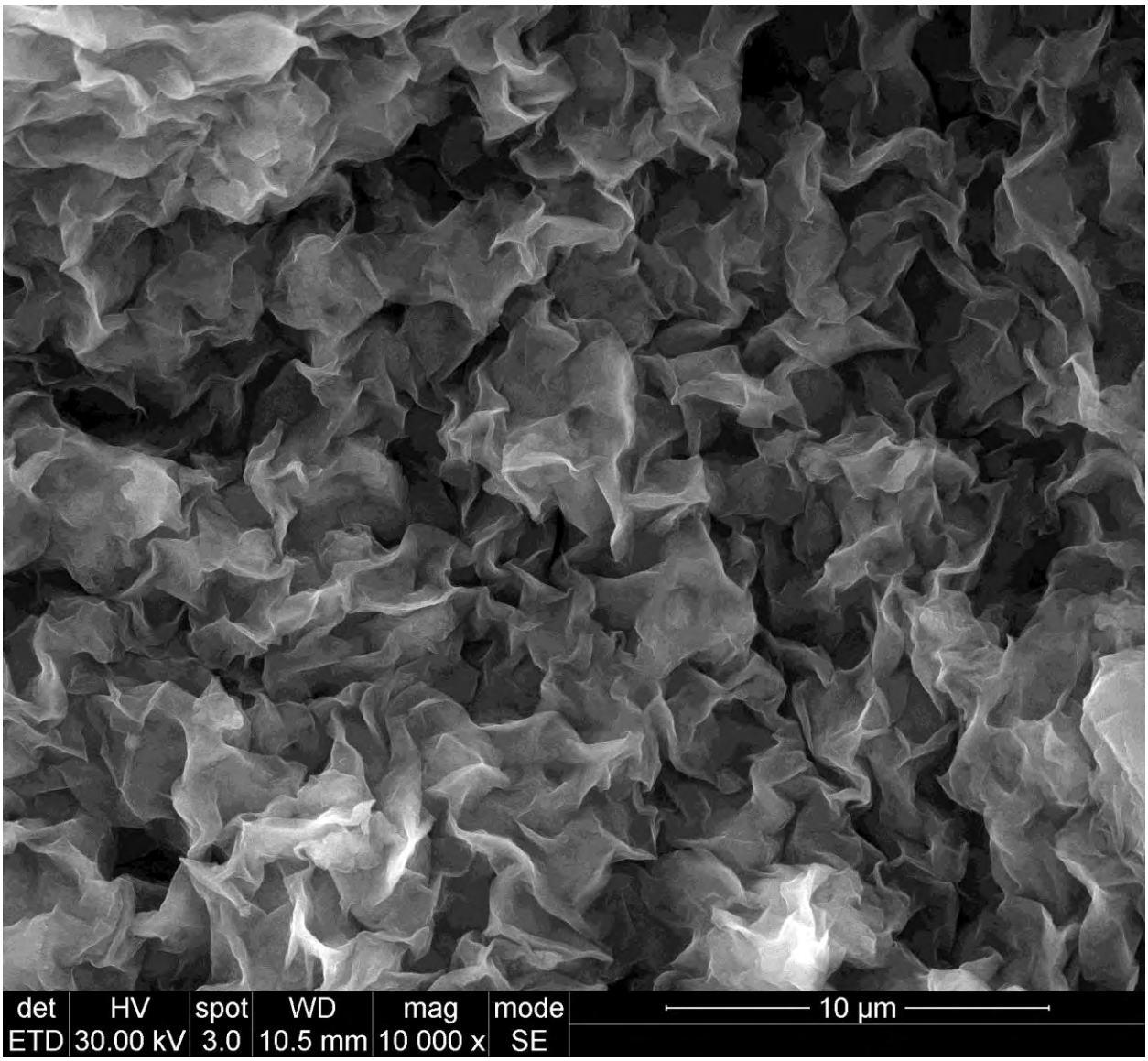
A.4-13: Back Scattered Electron image of pit corrosion advancing by crack corrosion in copper



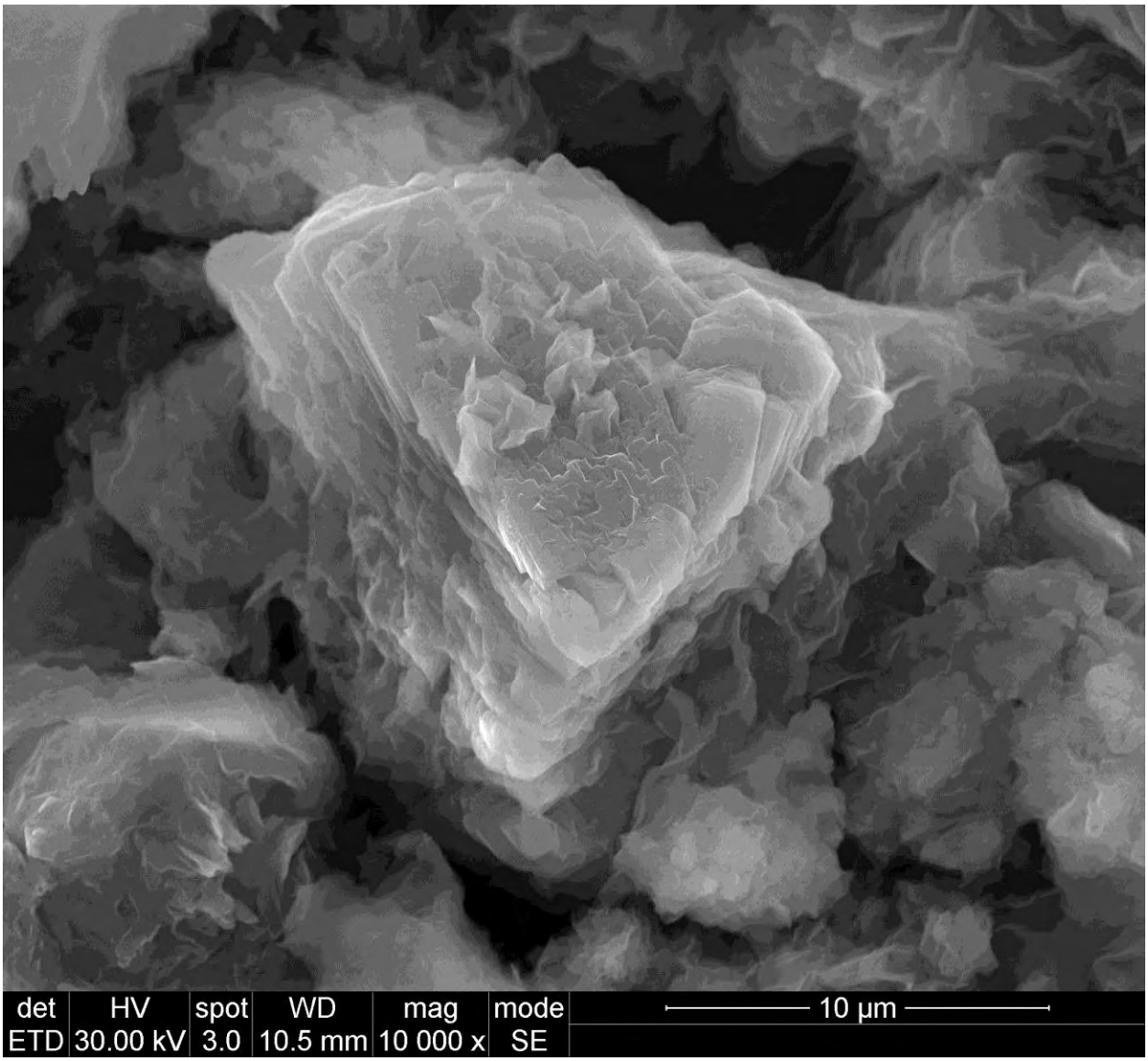
A.4-14: Back Scattered Electron image on post run bentonite material. Spongy appearing material in right center is pumice lapilli.



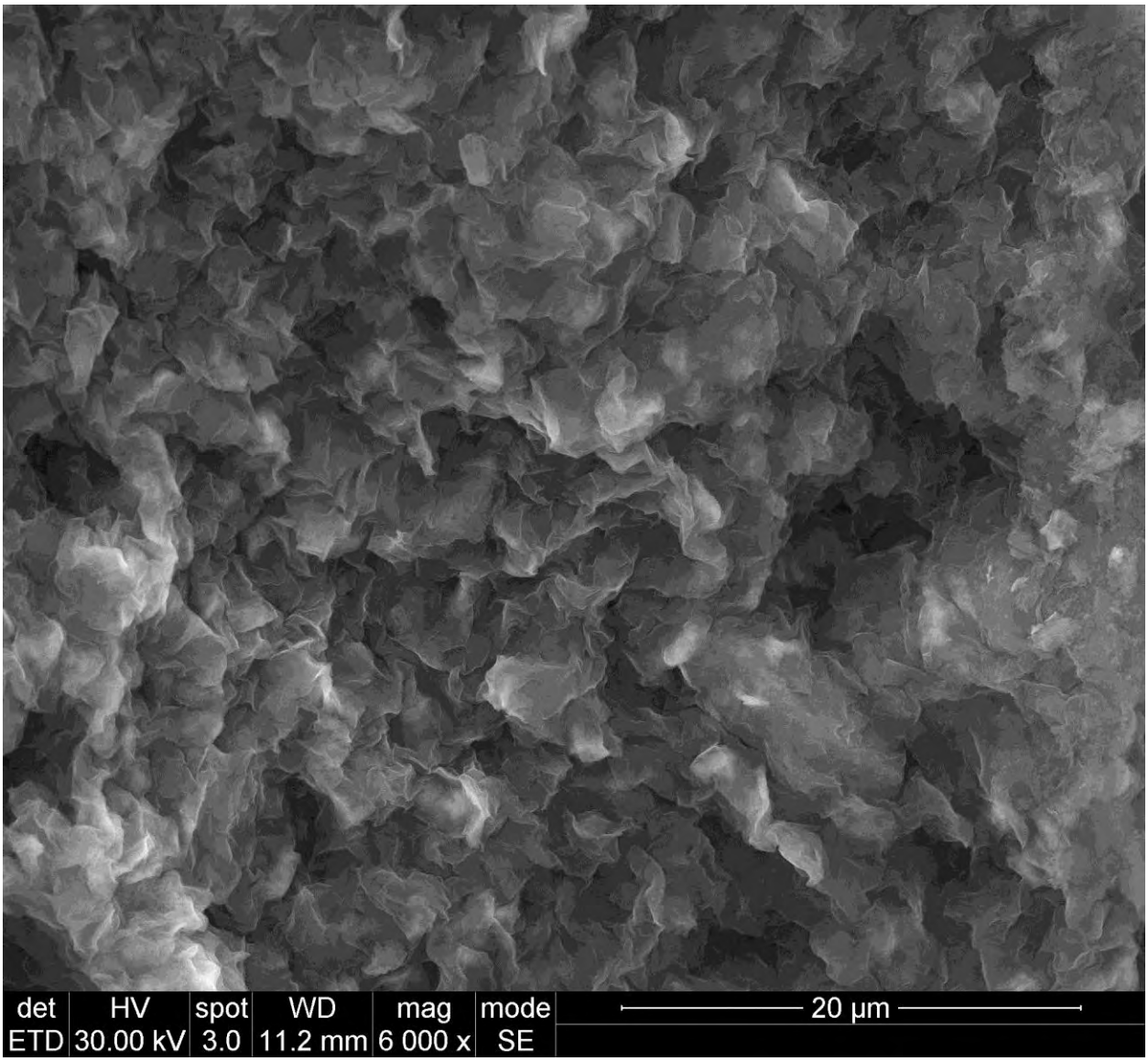
A.4-15: SEM image of smectite from EBS 4



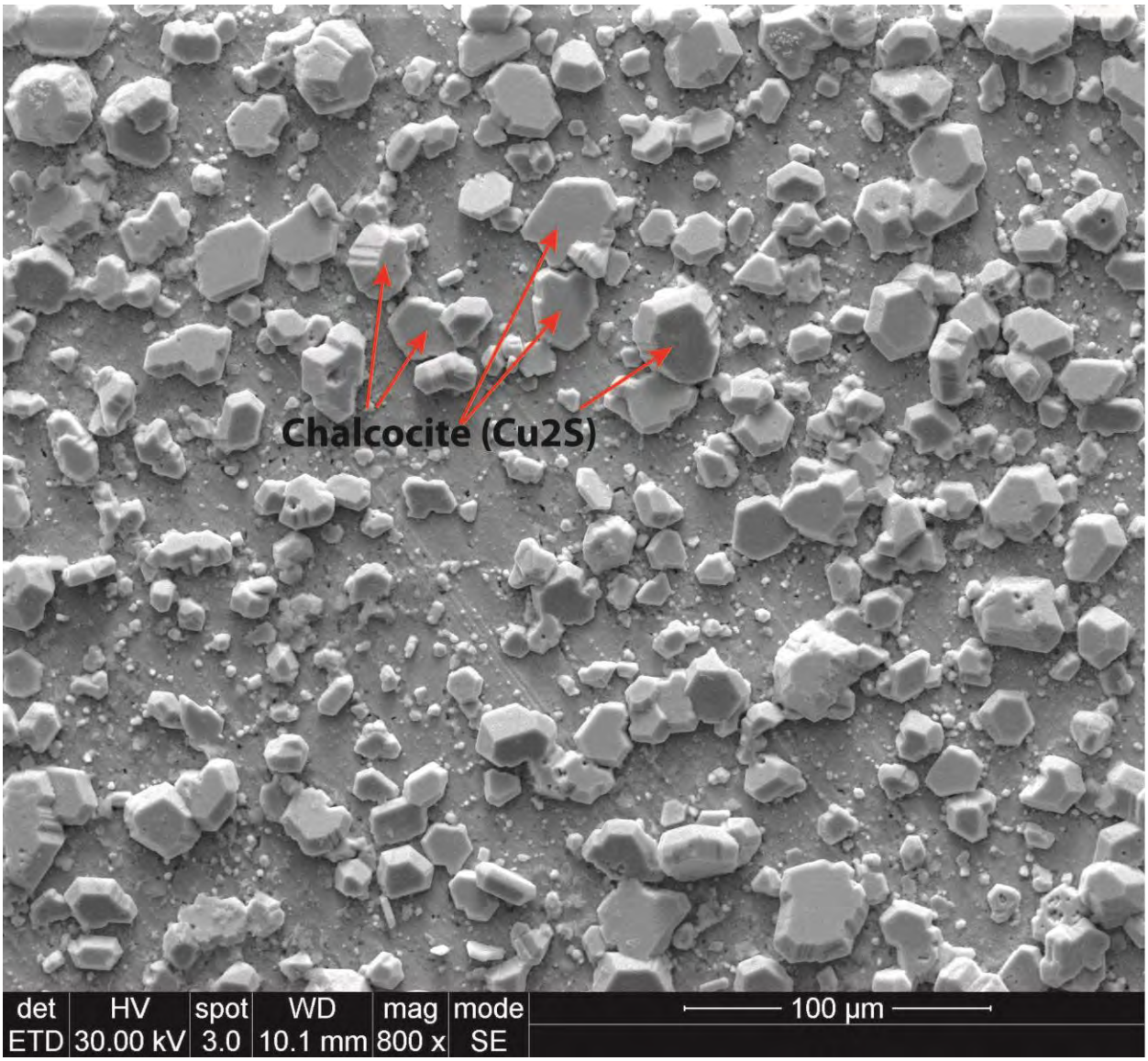
A.4-16: SEM image of smectite form EBS 4



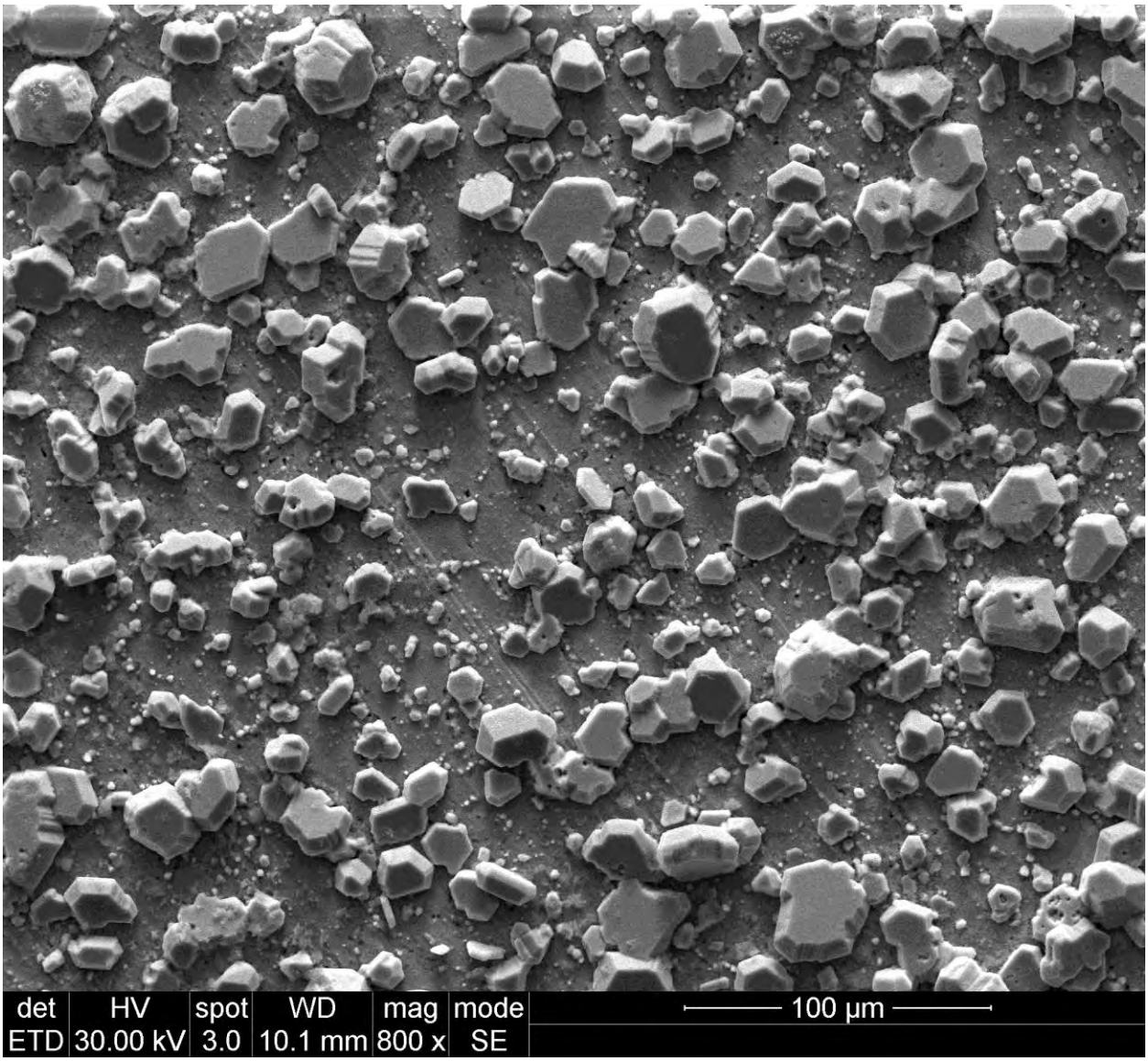
A.4-17: SEM close up image of smectite (EBS 4)



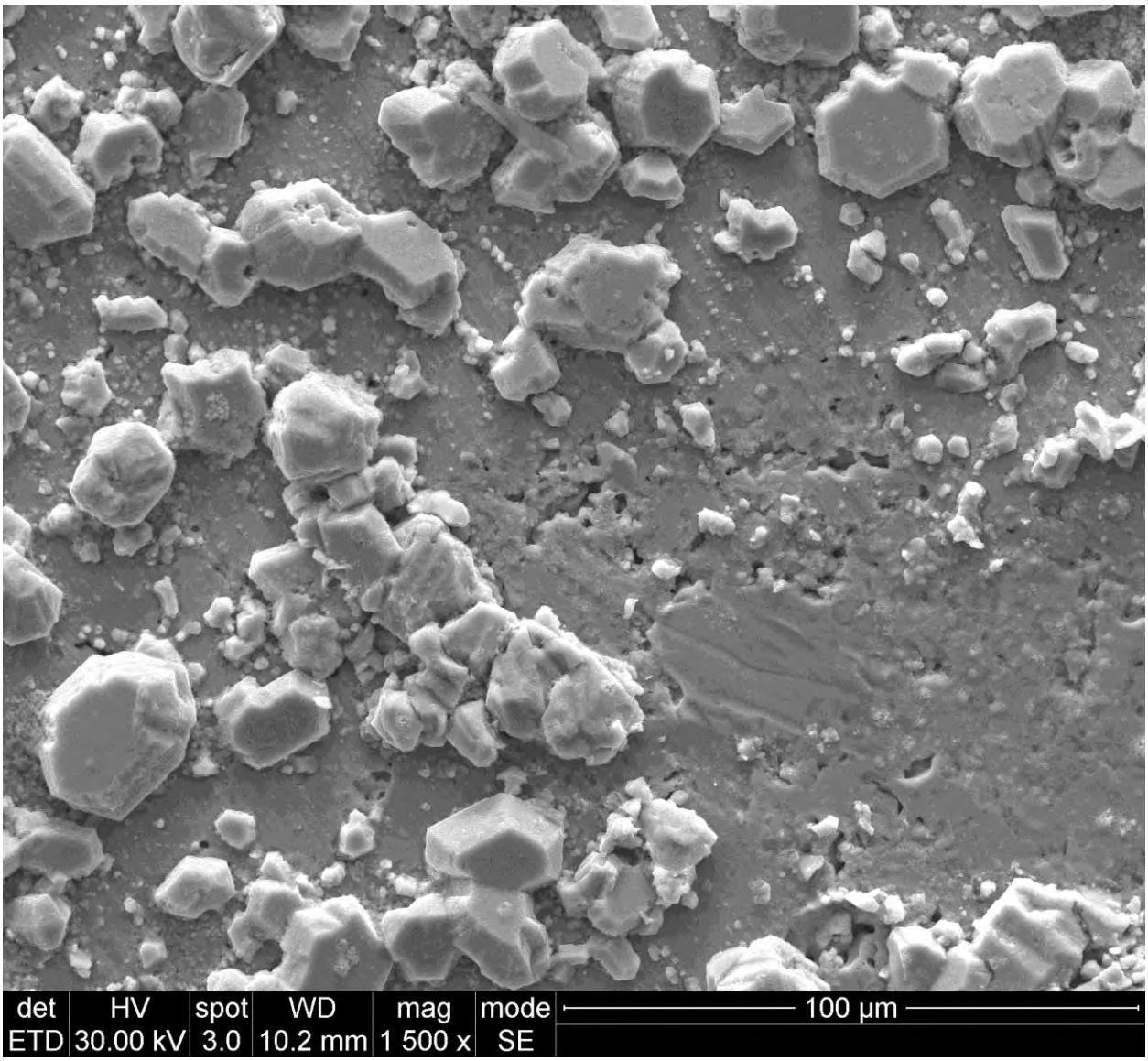
A.4-18: SEM image of smectite (EBS 4)



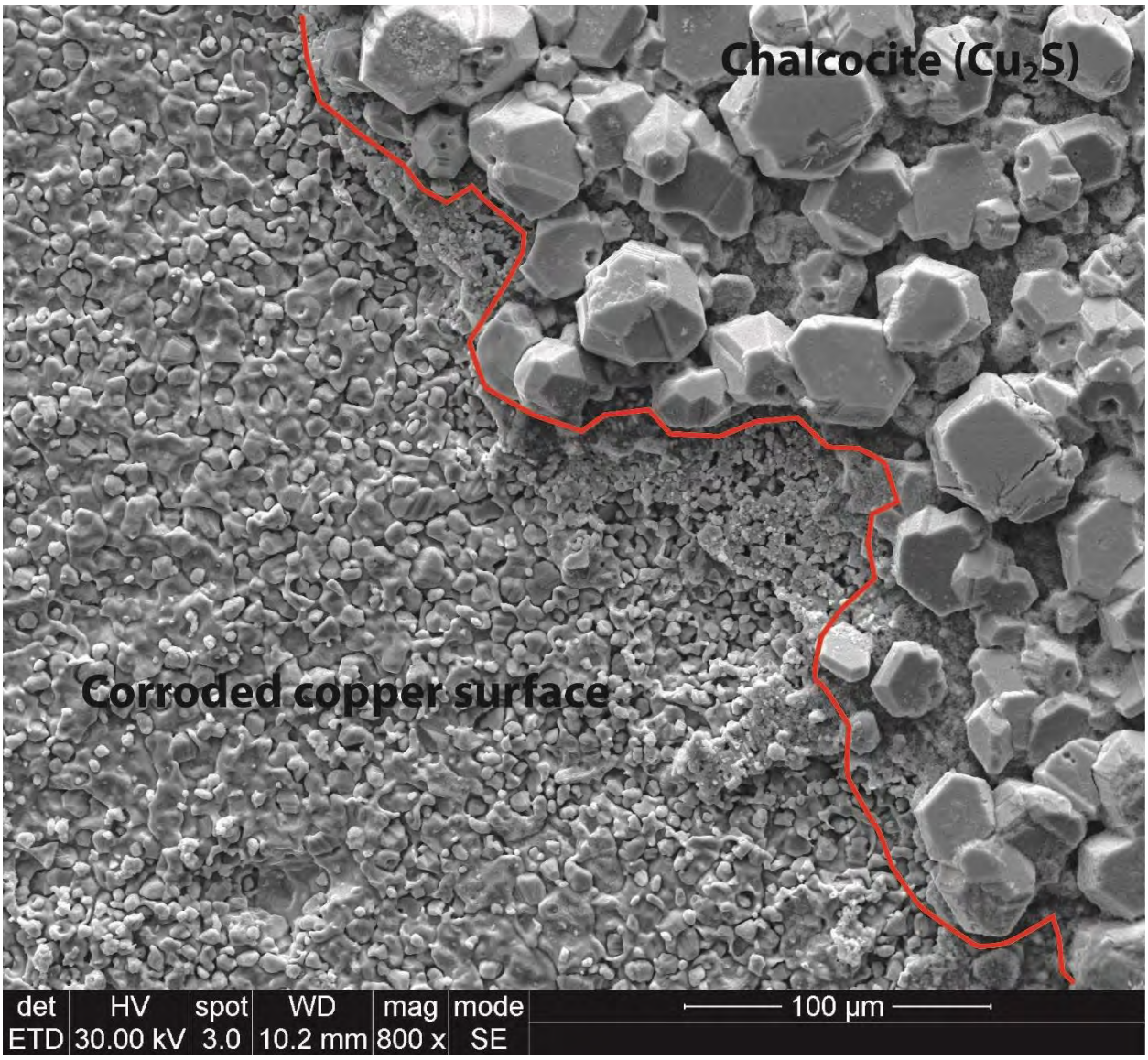
A.4-19: SEM image of chalcocite on copper from EBS 4



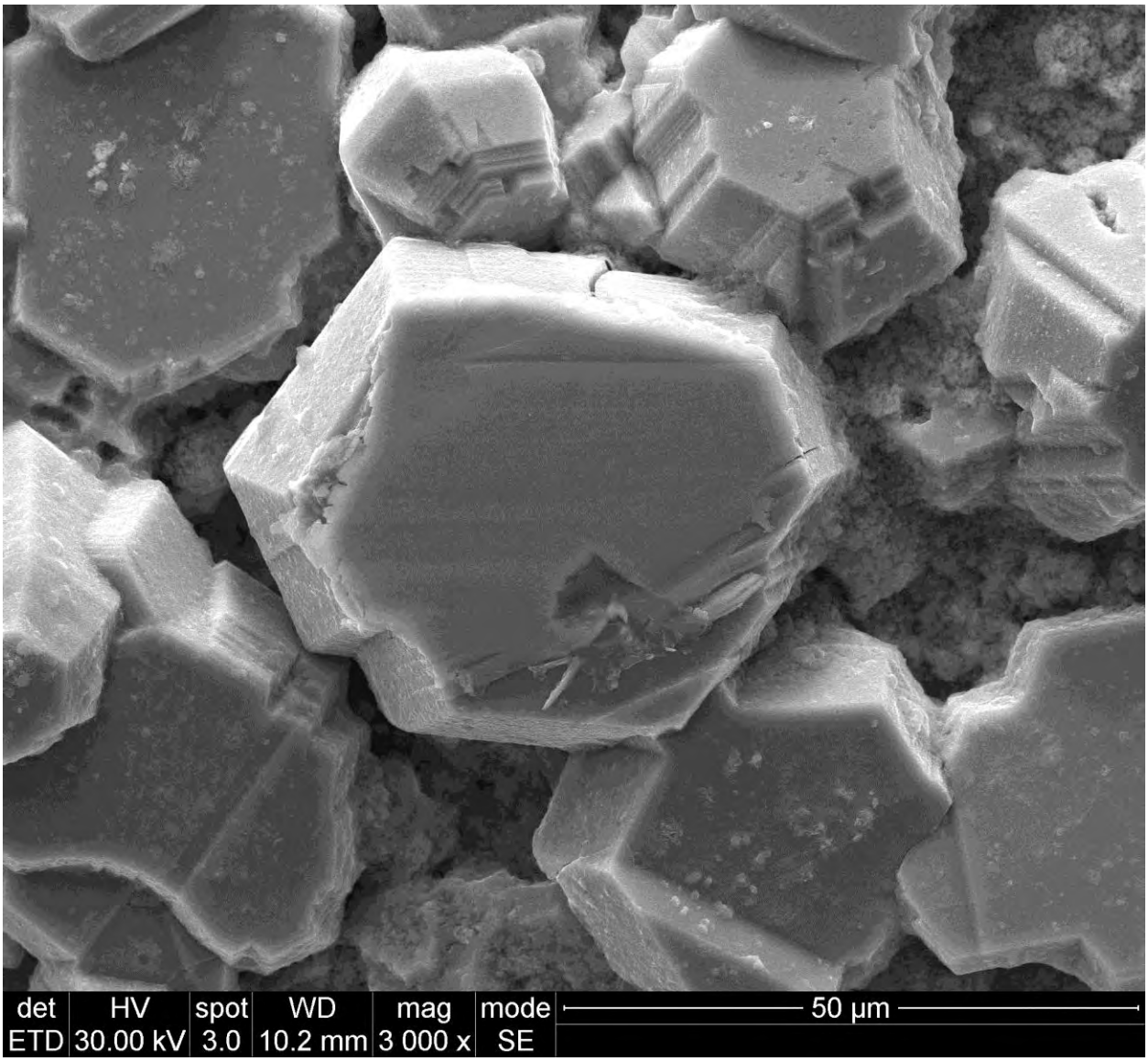
A.4-20: SEM image of chalcocite on copper from EBS 4



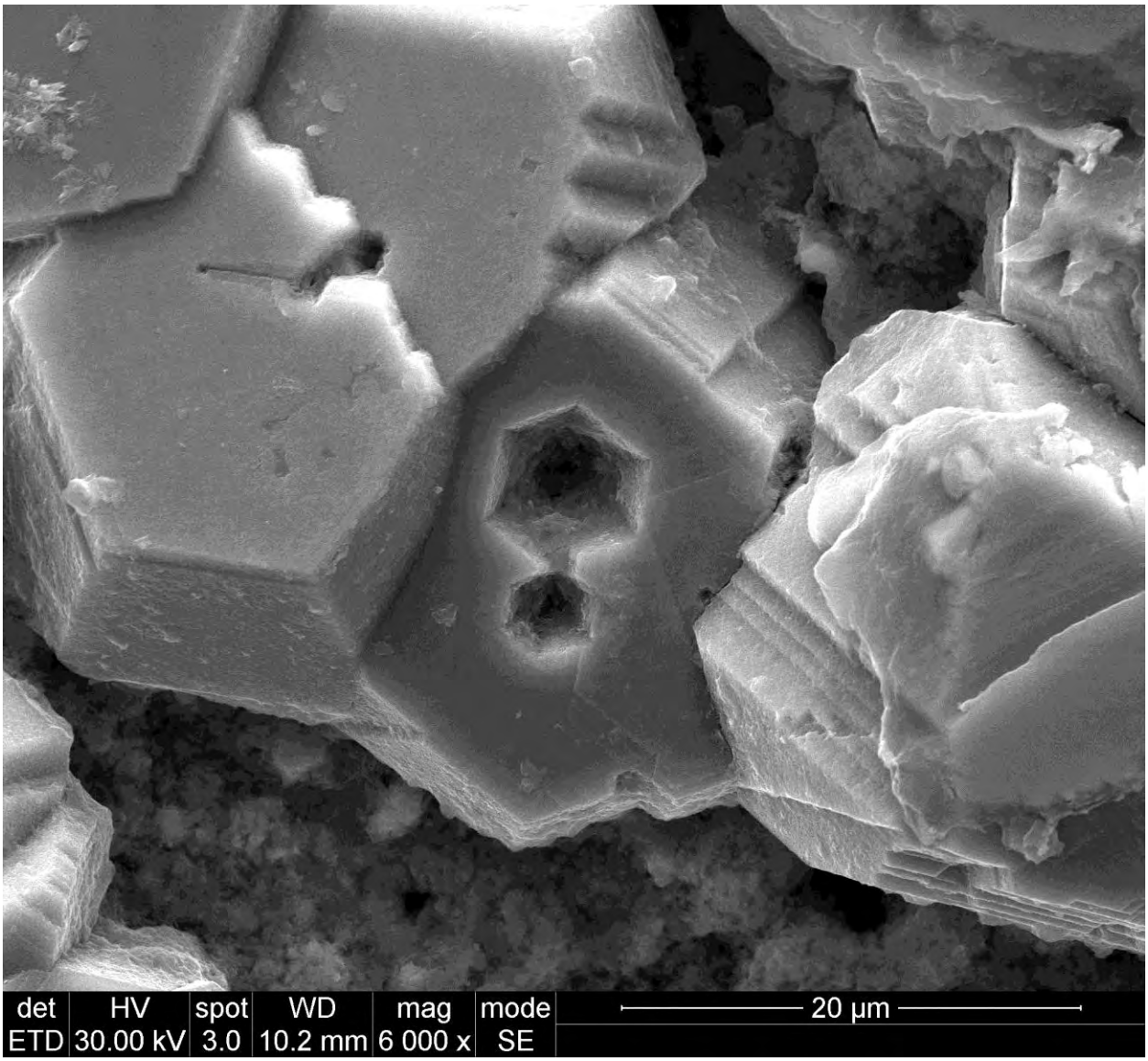
A.4-21: SEM image of chalcocite on copper from EBS 4



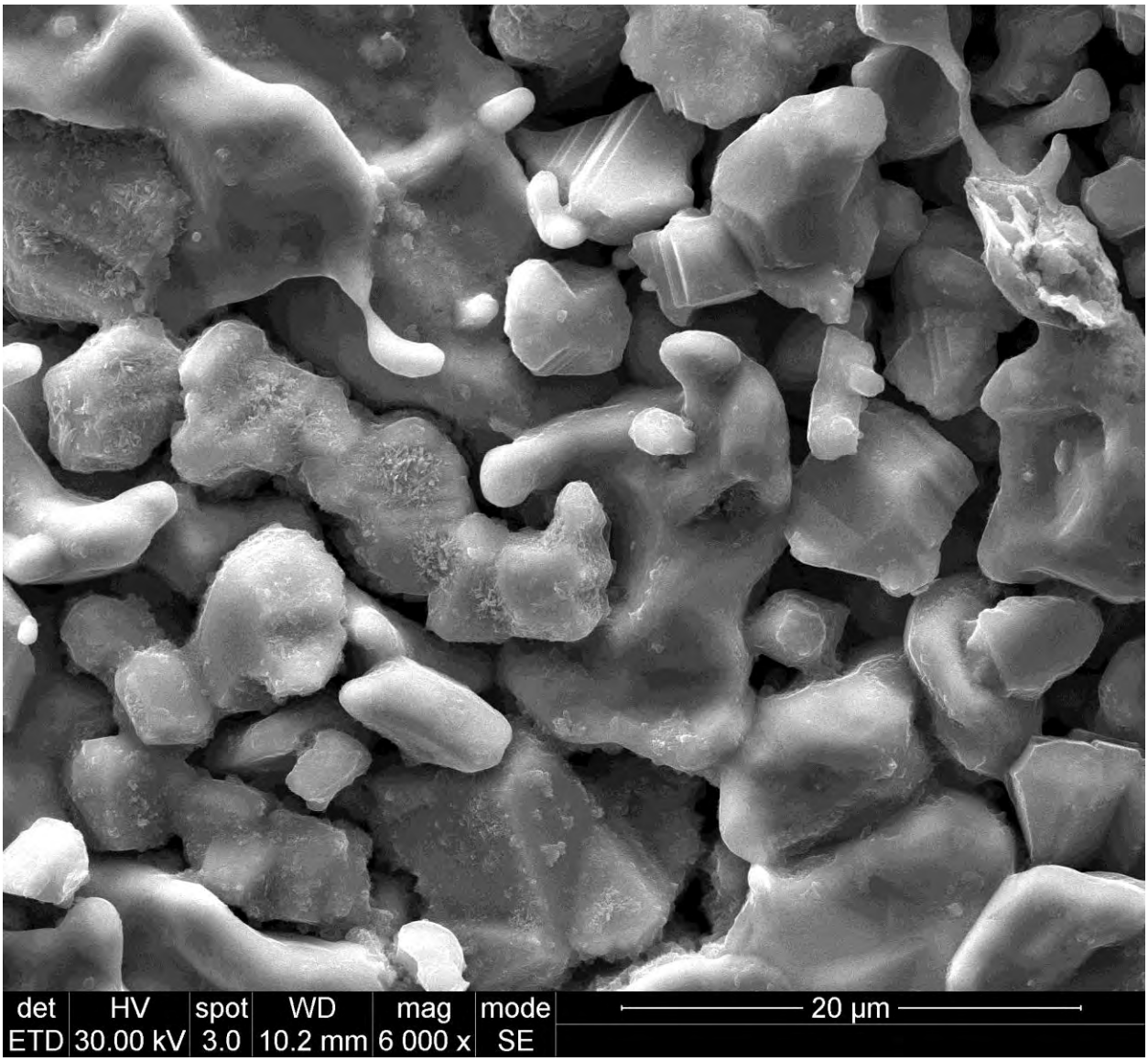
A.4-22: SEM image of chalcocite overlying corroded copper from EBS 4



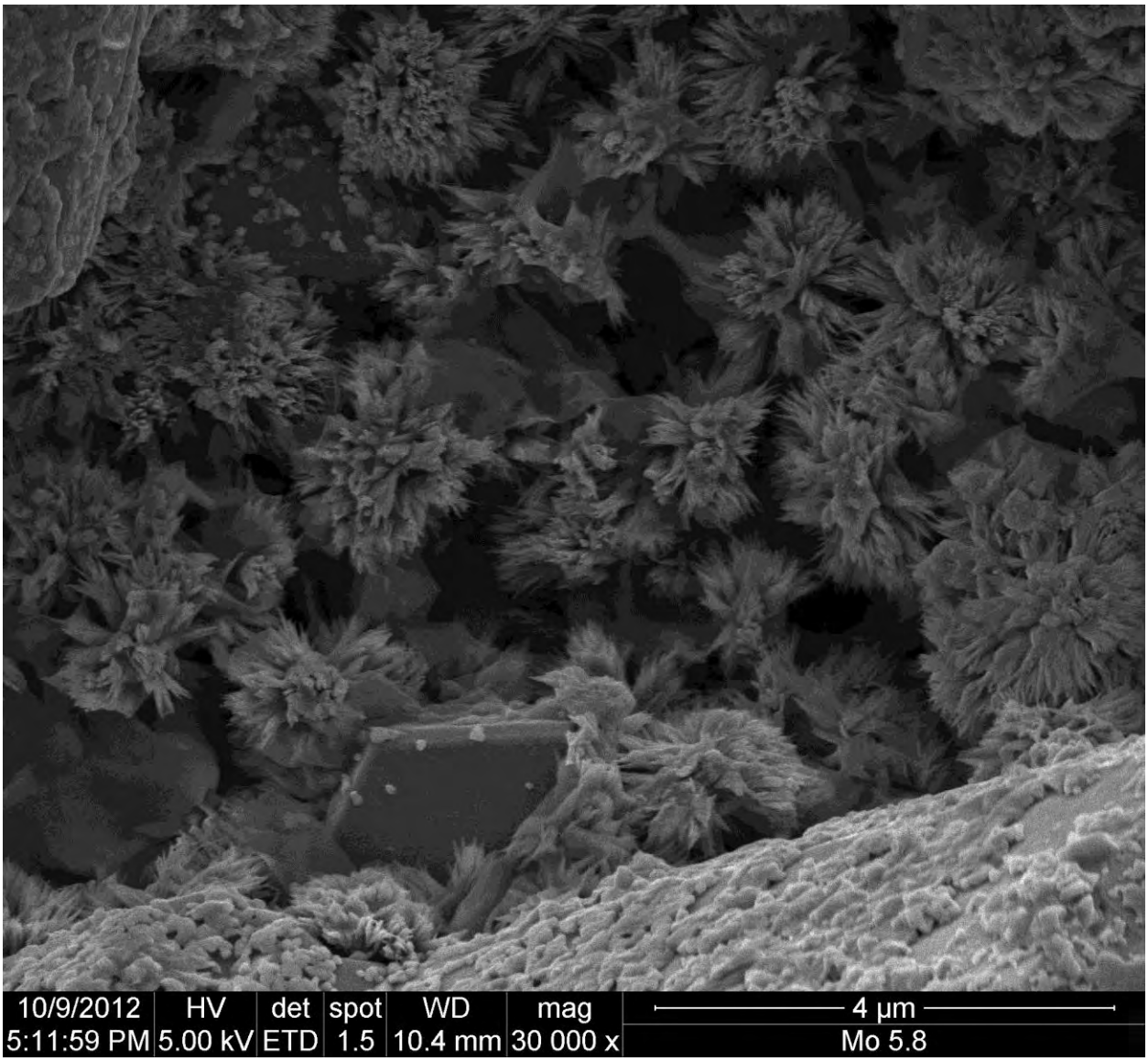
A.4-23: SEM image of chalcocite from EBS 4



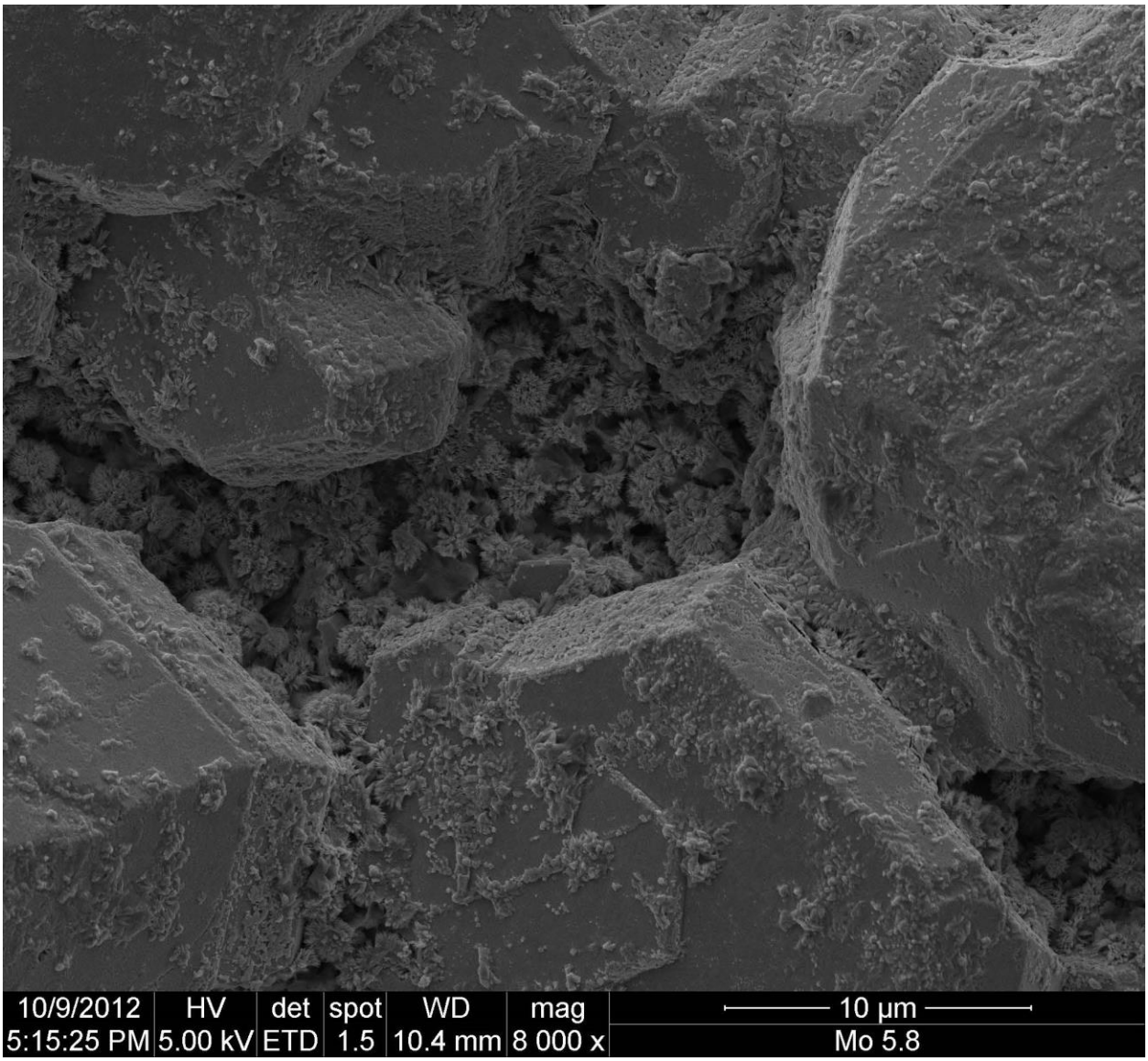
A.4-24: SEM image of rapid growth of chalcocite



A.4-25: SEM image of copper pit corrosion from EBS 4



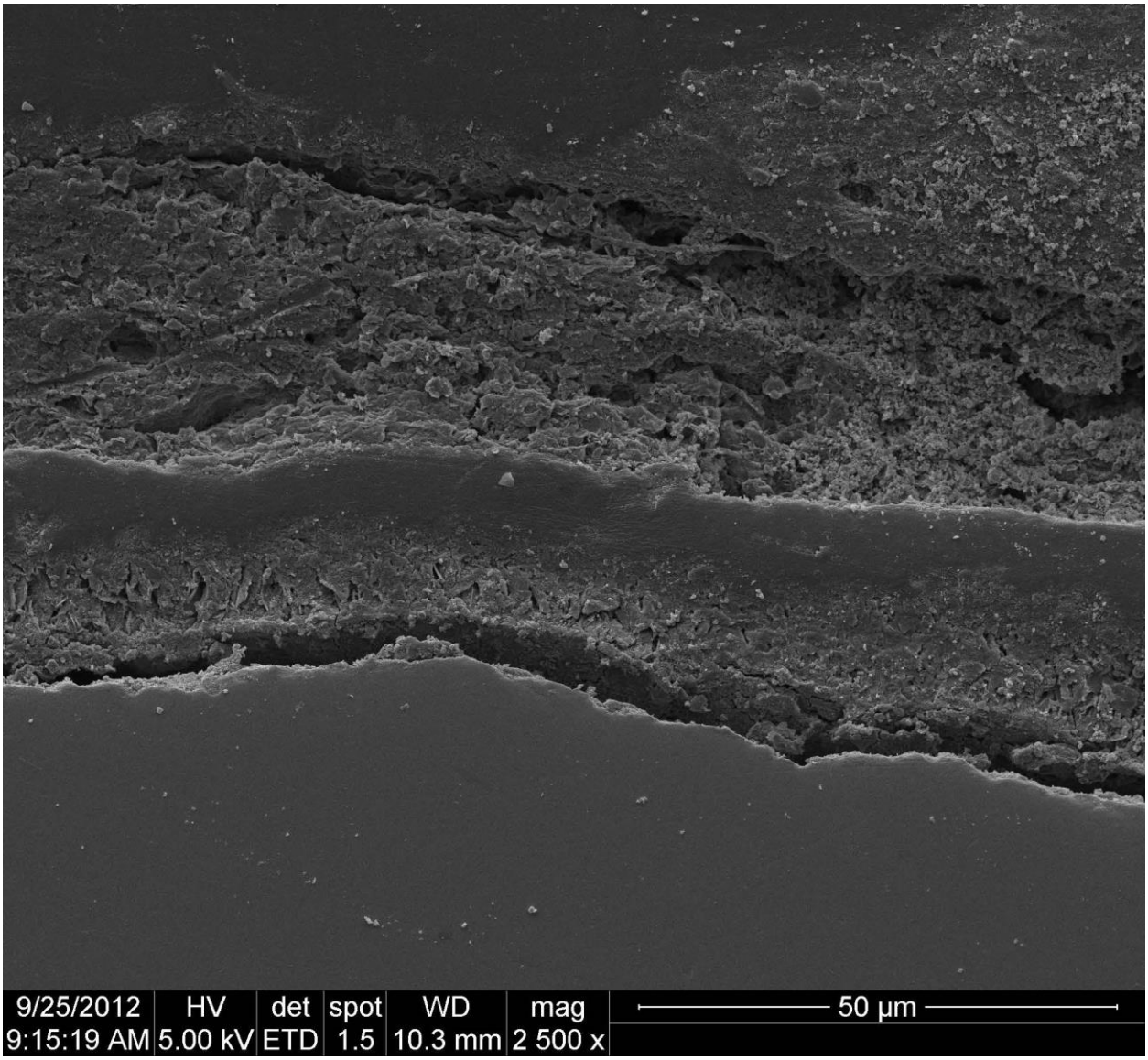
A.4-26: SEM image of unknown copper-rich fibers



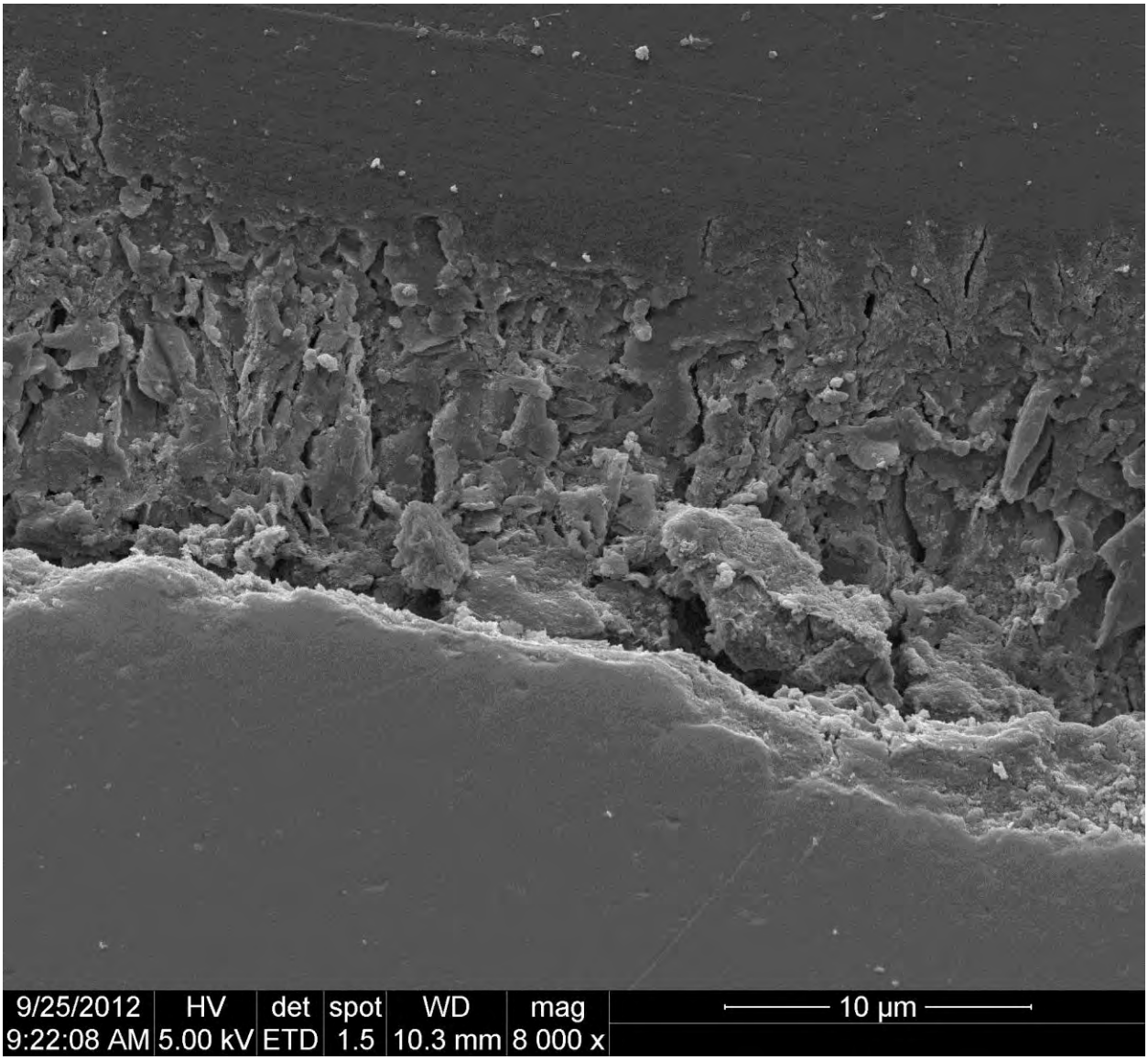
A.4-27: SEM image of unknown copper-rich fibers coating chalcocite crystals

Appendix A.5

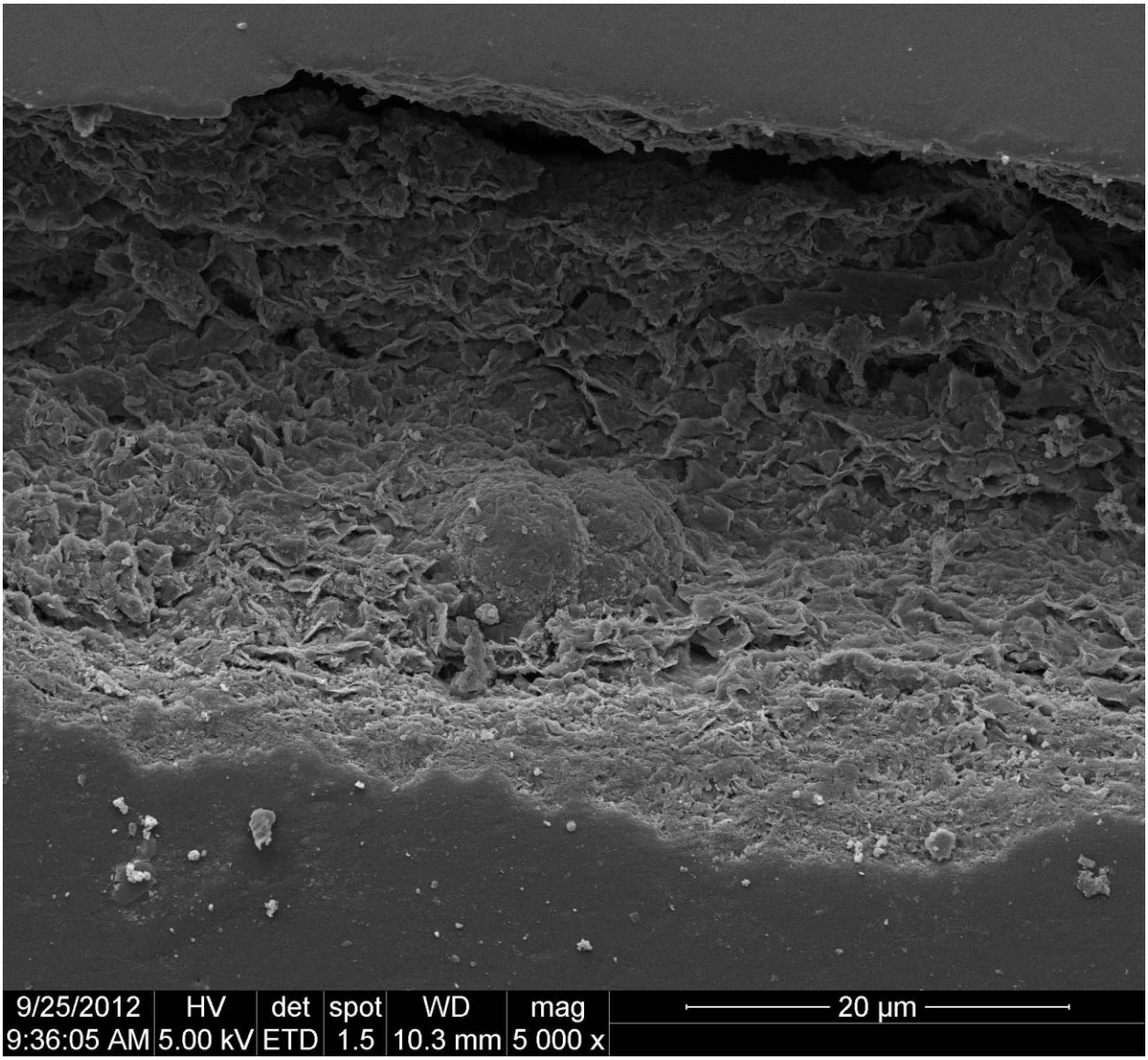
EBS-5 Isothermal at 300°C and 150 bar for 6 weeks run with 304 Stainless Steel



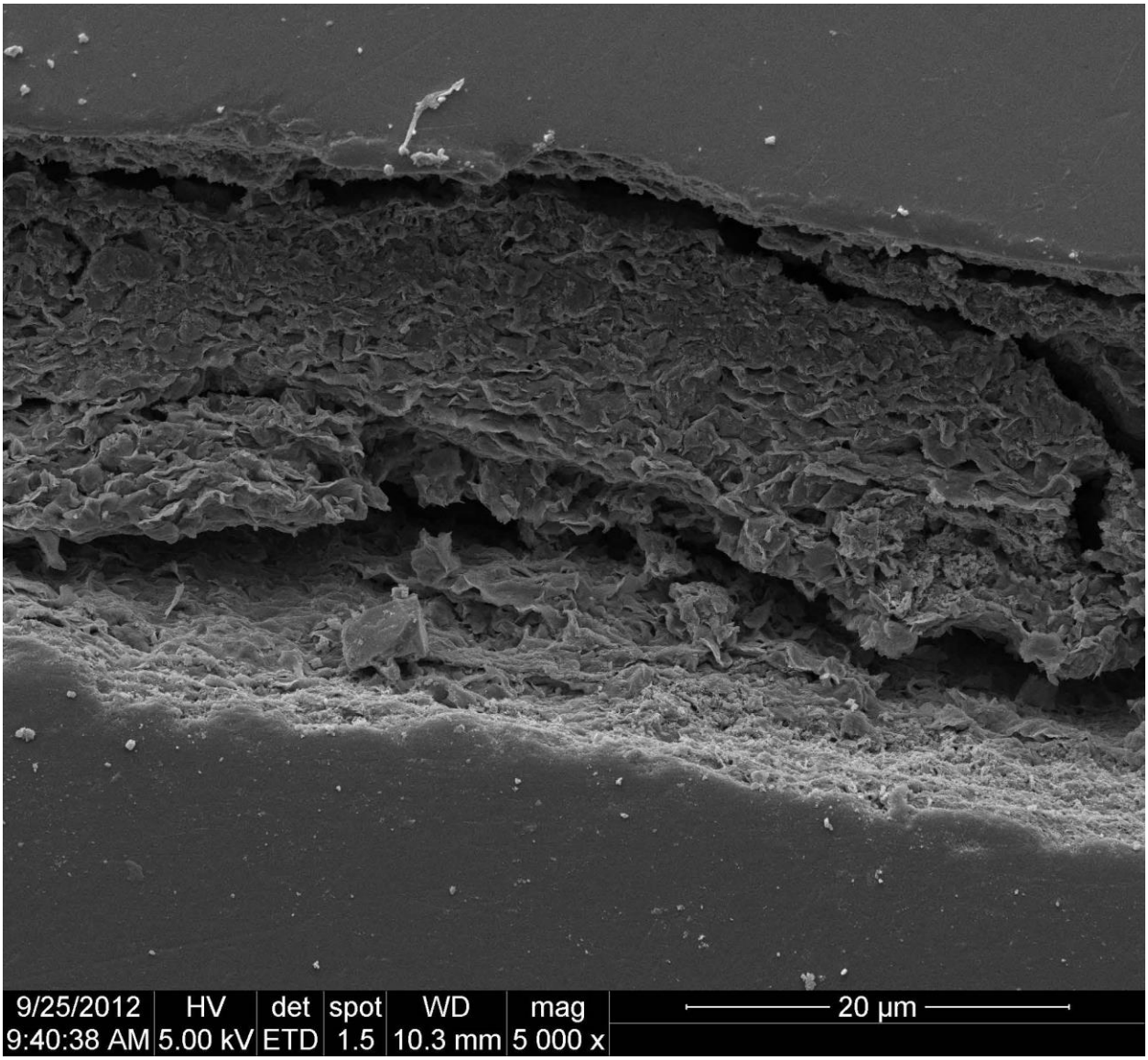
A.5-1. Back Scattered Electron image of steel-saponite cross section from EBS 5



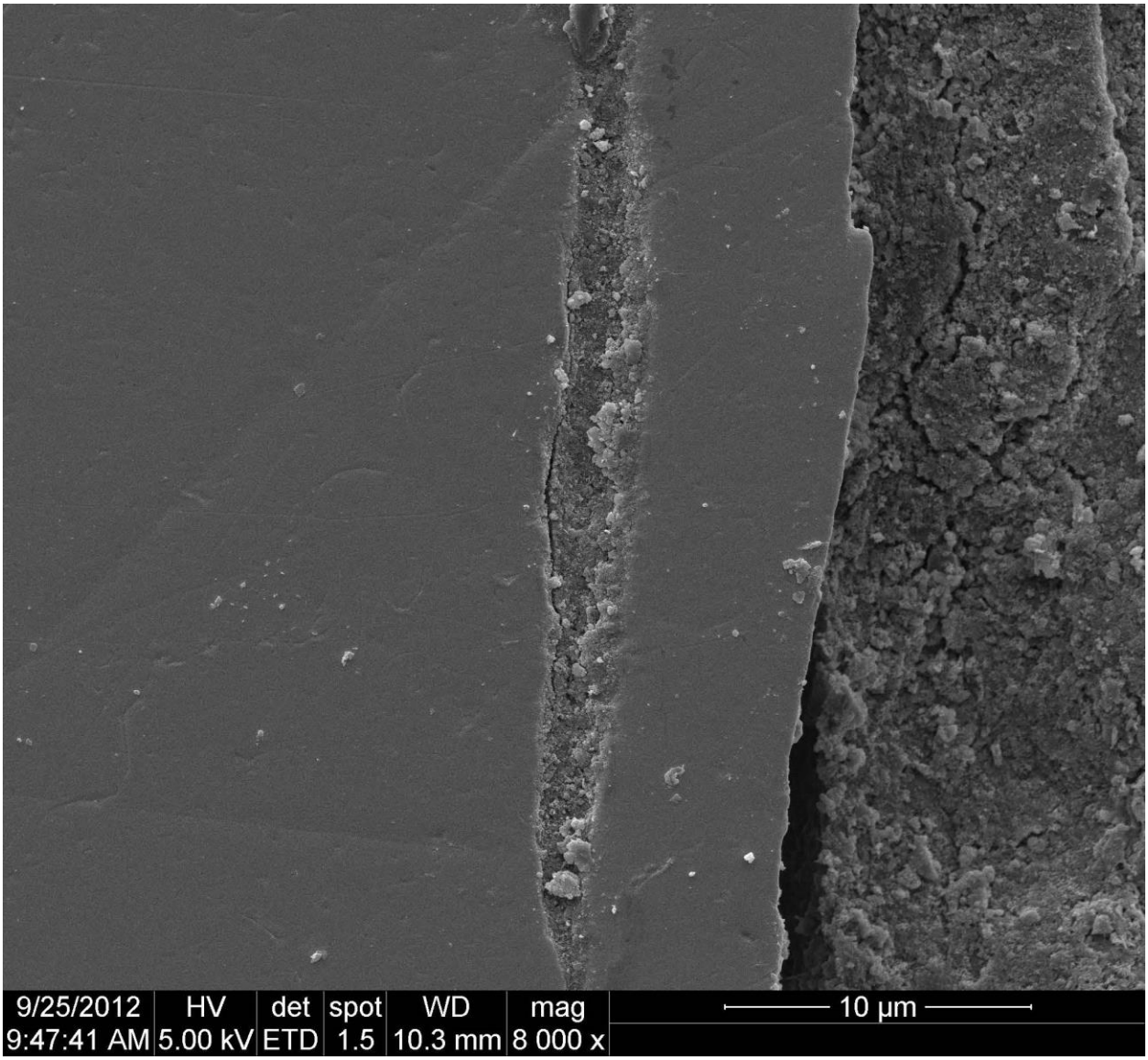
A.5-2. Back Scattered Electron image of steel-saponite cross section from EBS 5



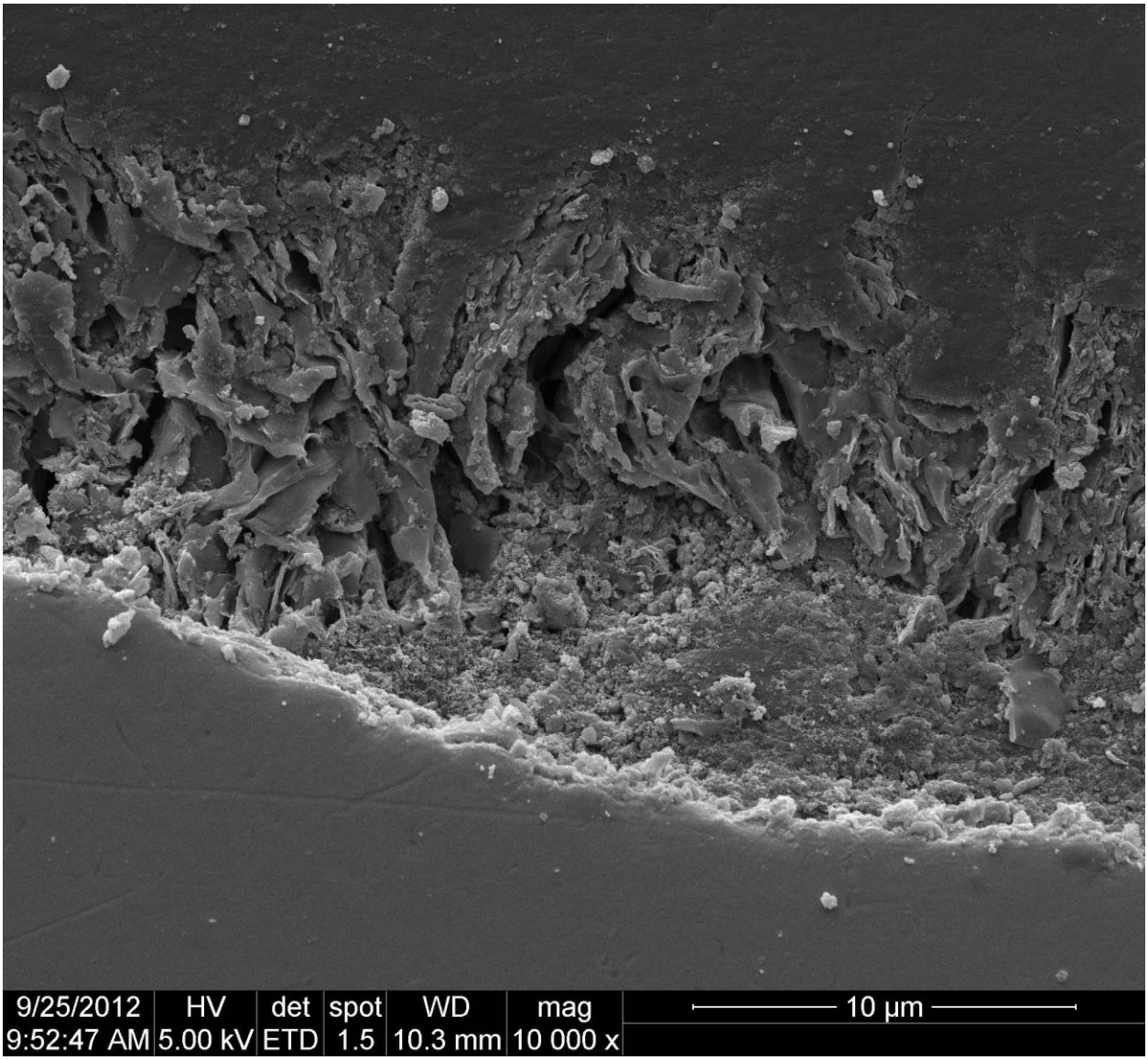
A.5-3. Back Scattered Electron image of steel-saponite (with embedded analcime) cross section



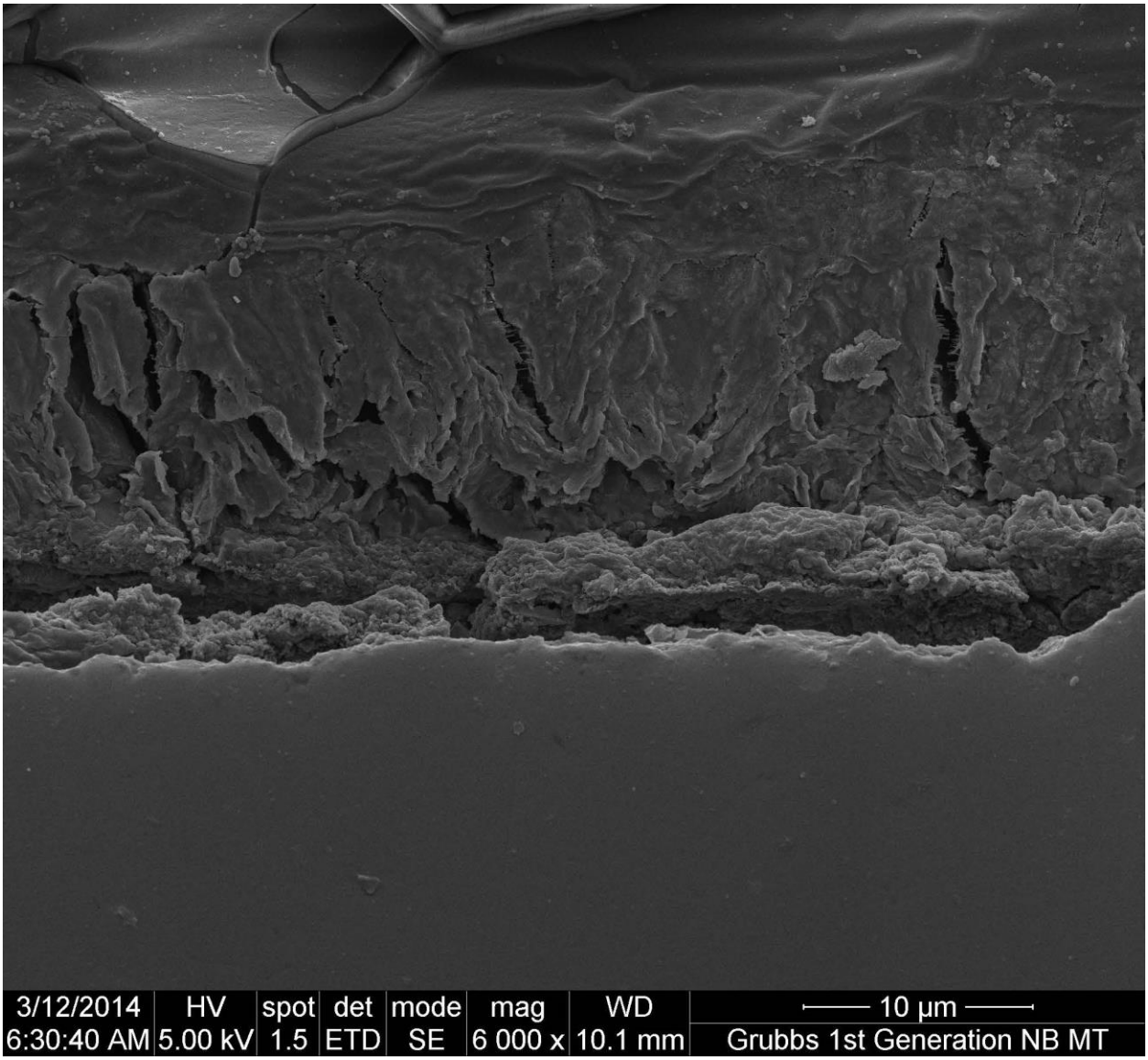
A.5-4. Back Scattered Electron image of saponite in steel crack



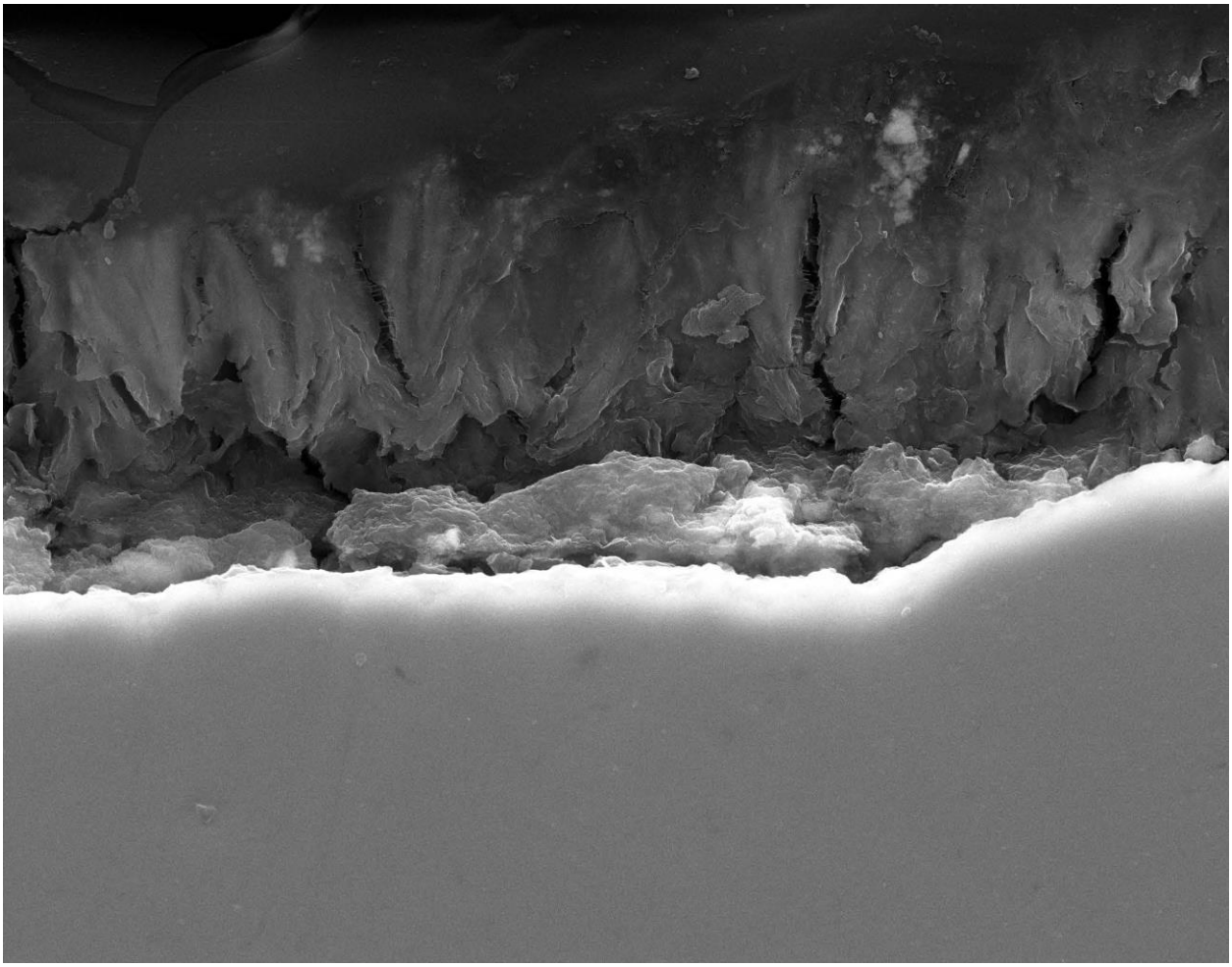
A.5-5. Back Scattered Electron image of saponite in steel crack



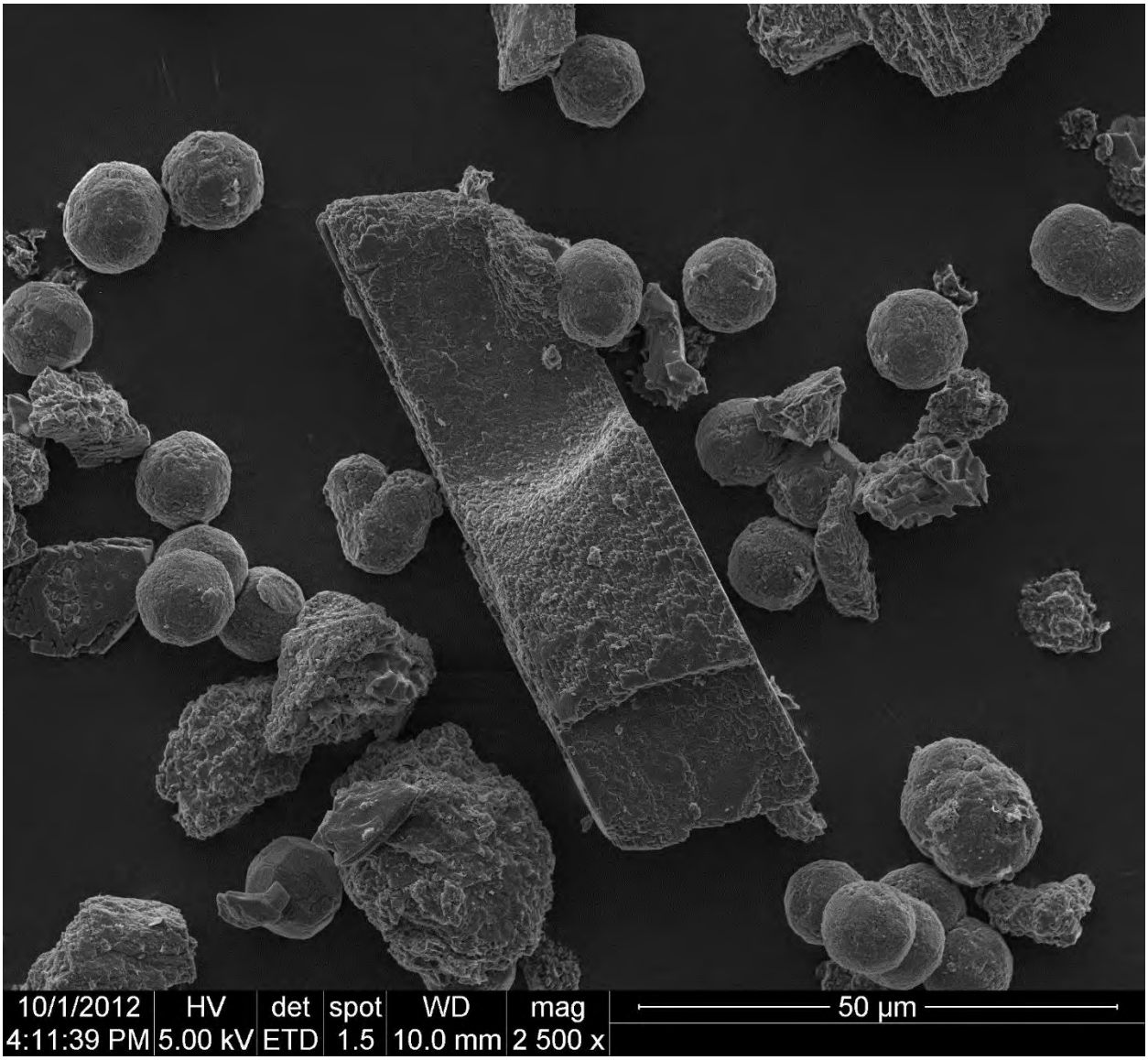
A.5-6. Back Scattered Electron image of large saponite crystals perpendicular to steel crack



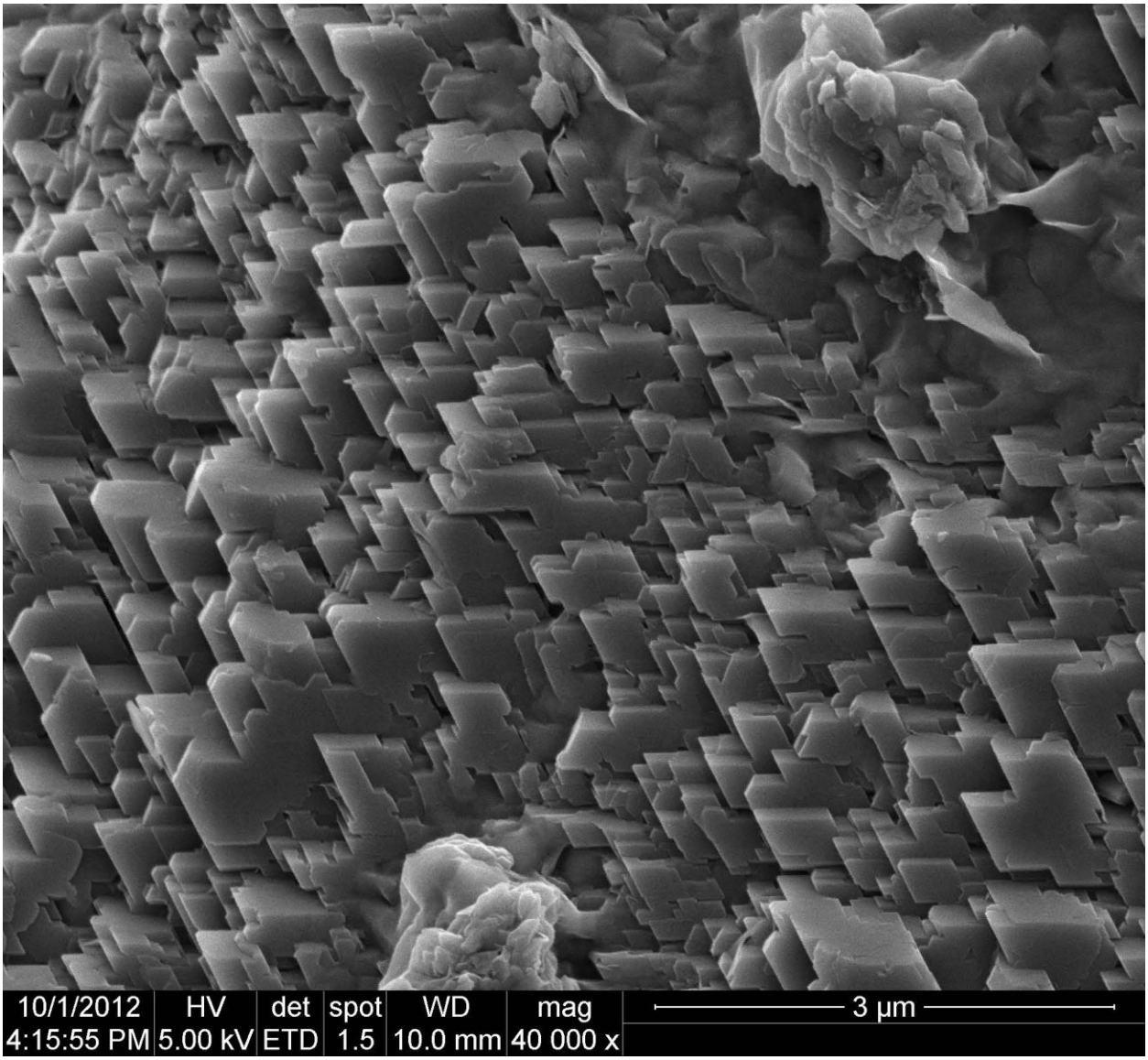
A.5-7. Back Scattered Electron image of large saponite crystals perpendicular to steel crack



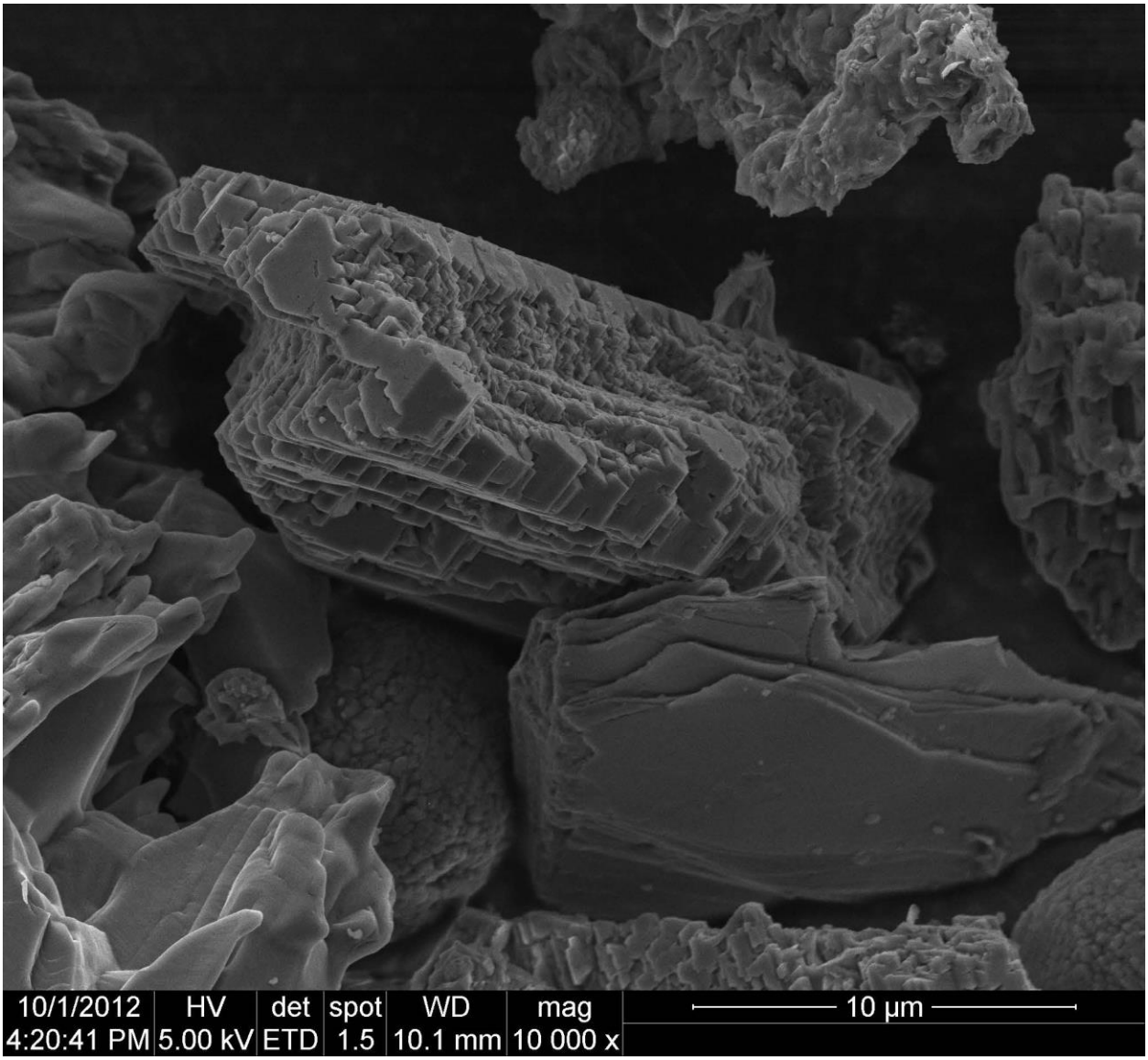
A.5-8. Back Scattered Electron image of large saponite crystals perpendicular to steel crack



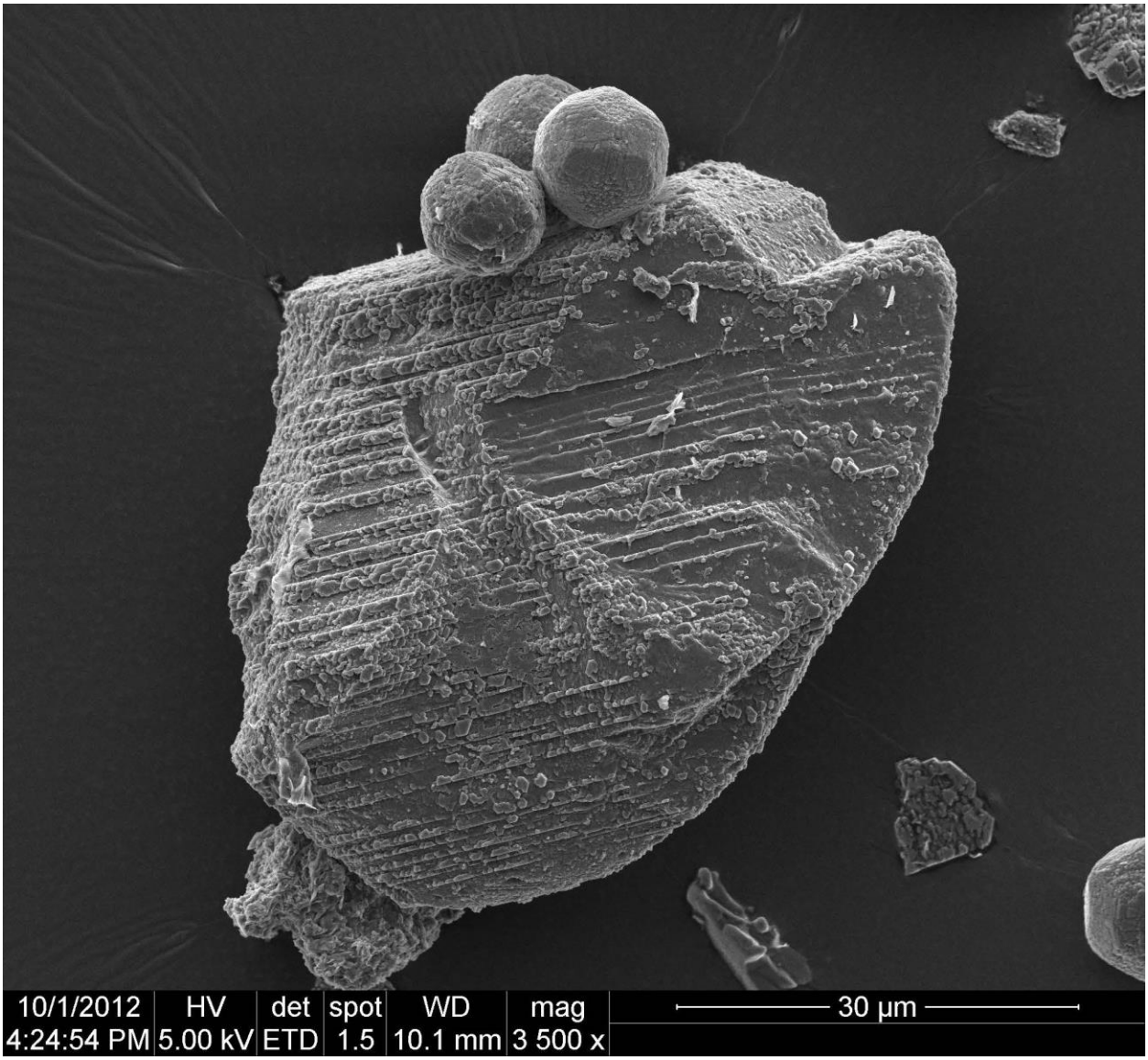
A.5-9: SEM image of mostly Analcime separates from EBS 5



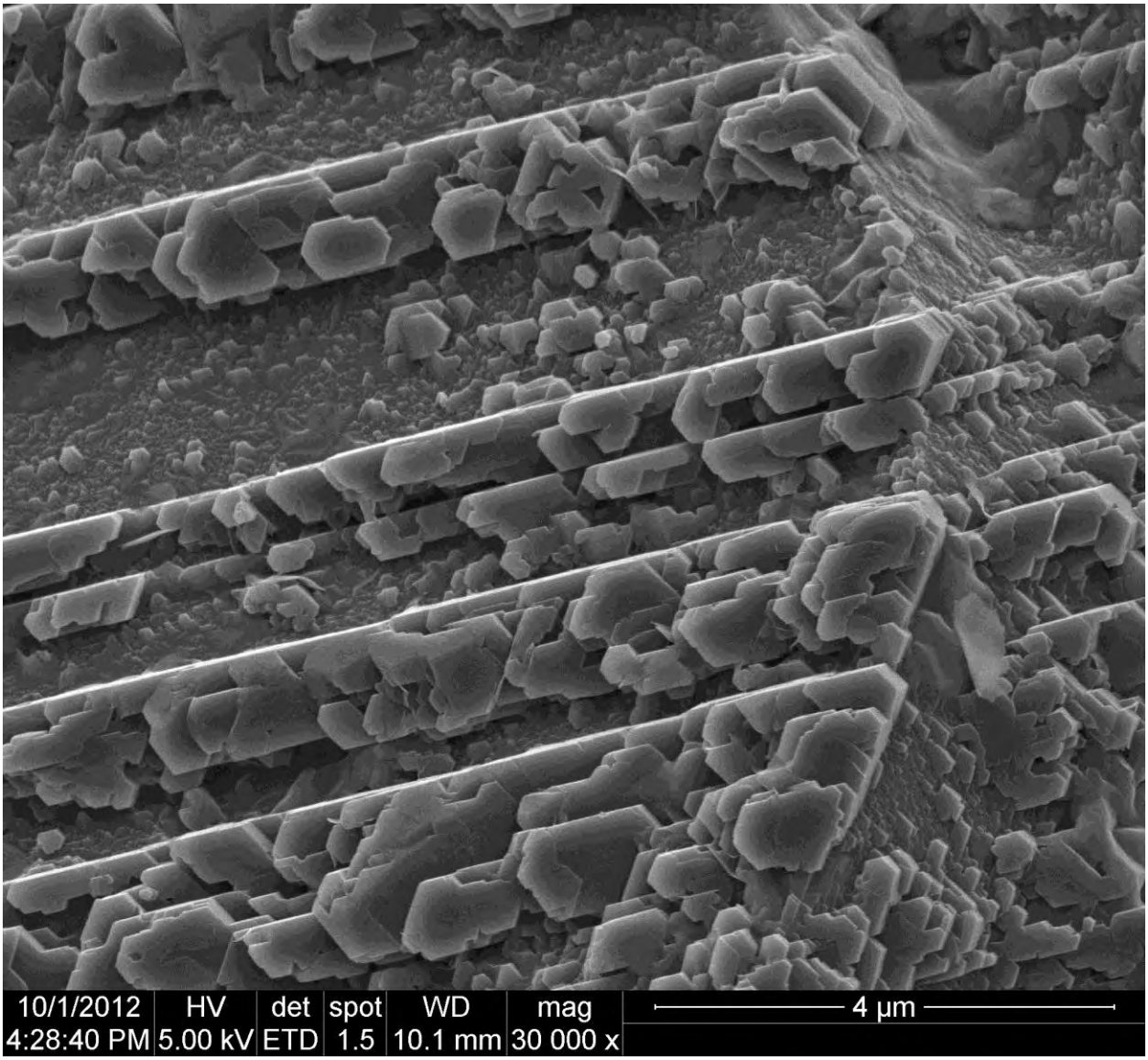
A.5-10: SEM image of dissolution etching feature (potassium feldspar)



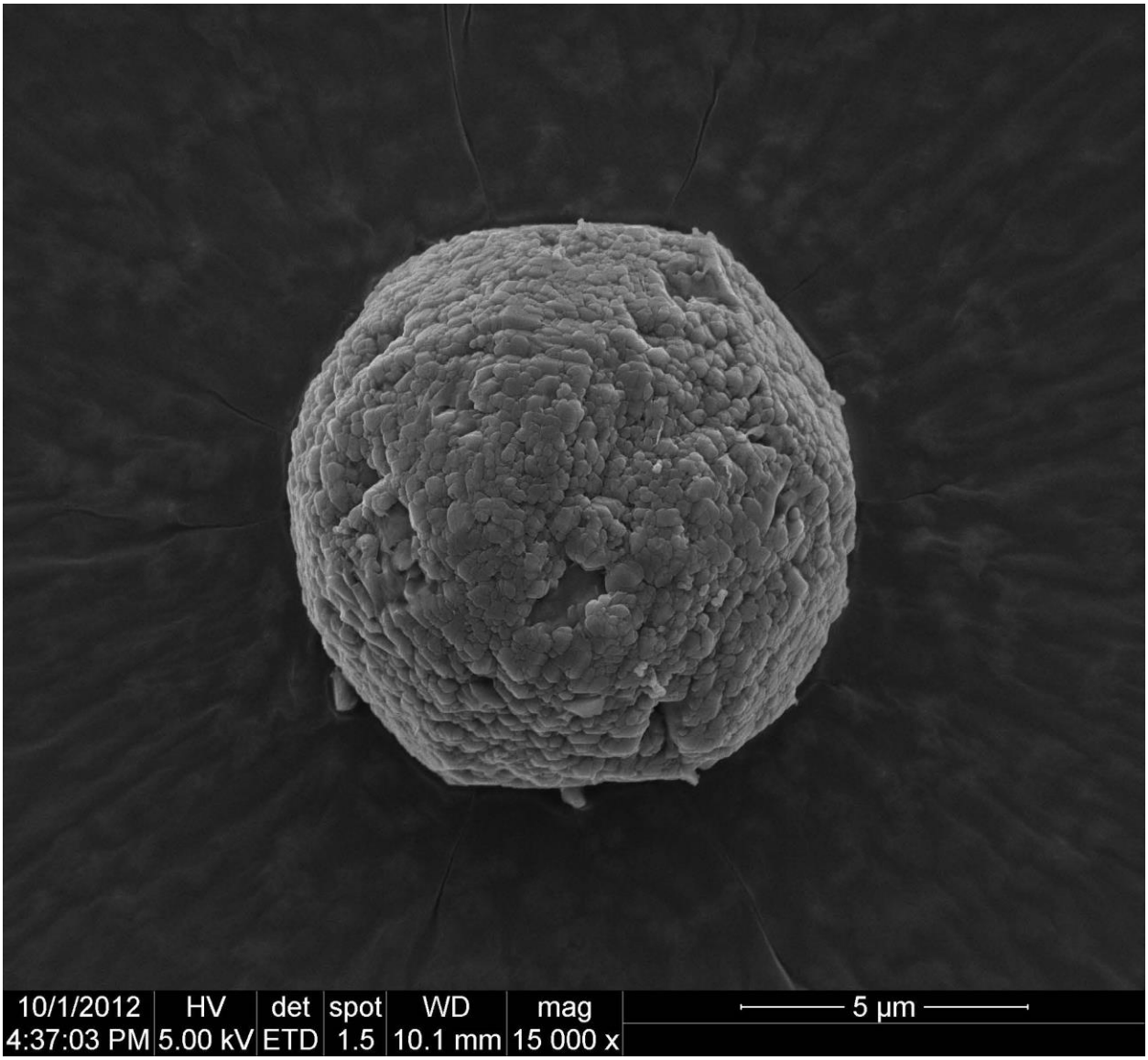
A.5-11: SEM image of potassium feldspar dissolution from EBS 5



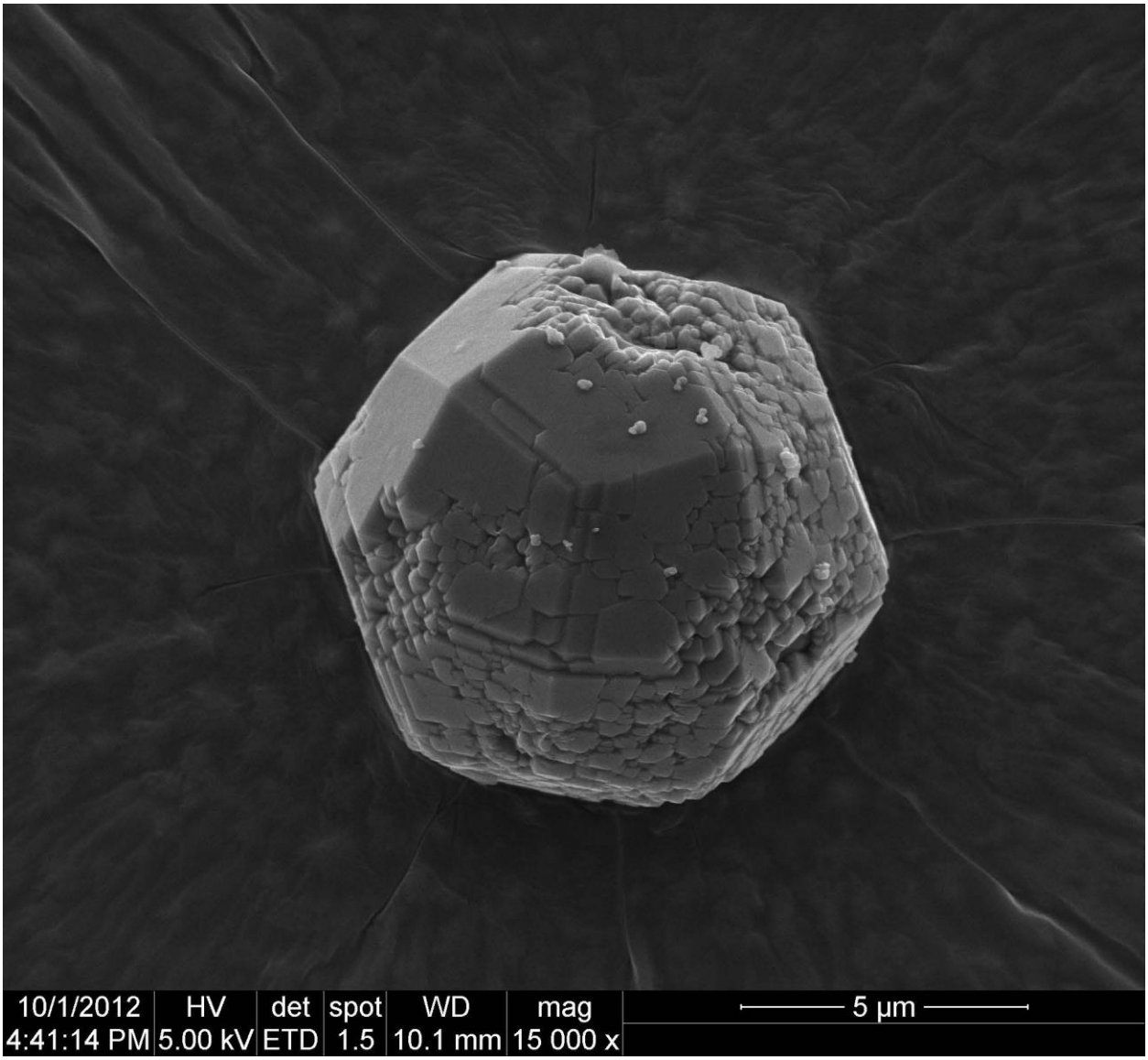
A.5-12: SEM image of plagioclase overgrowths from EBS 5



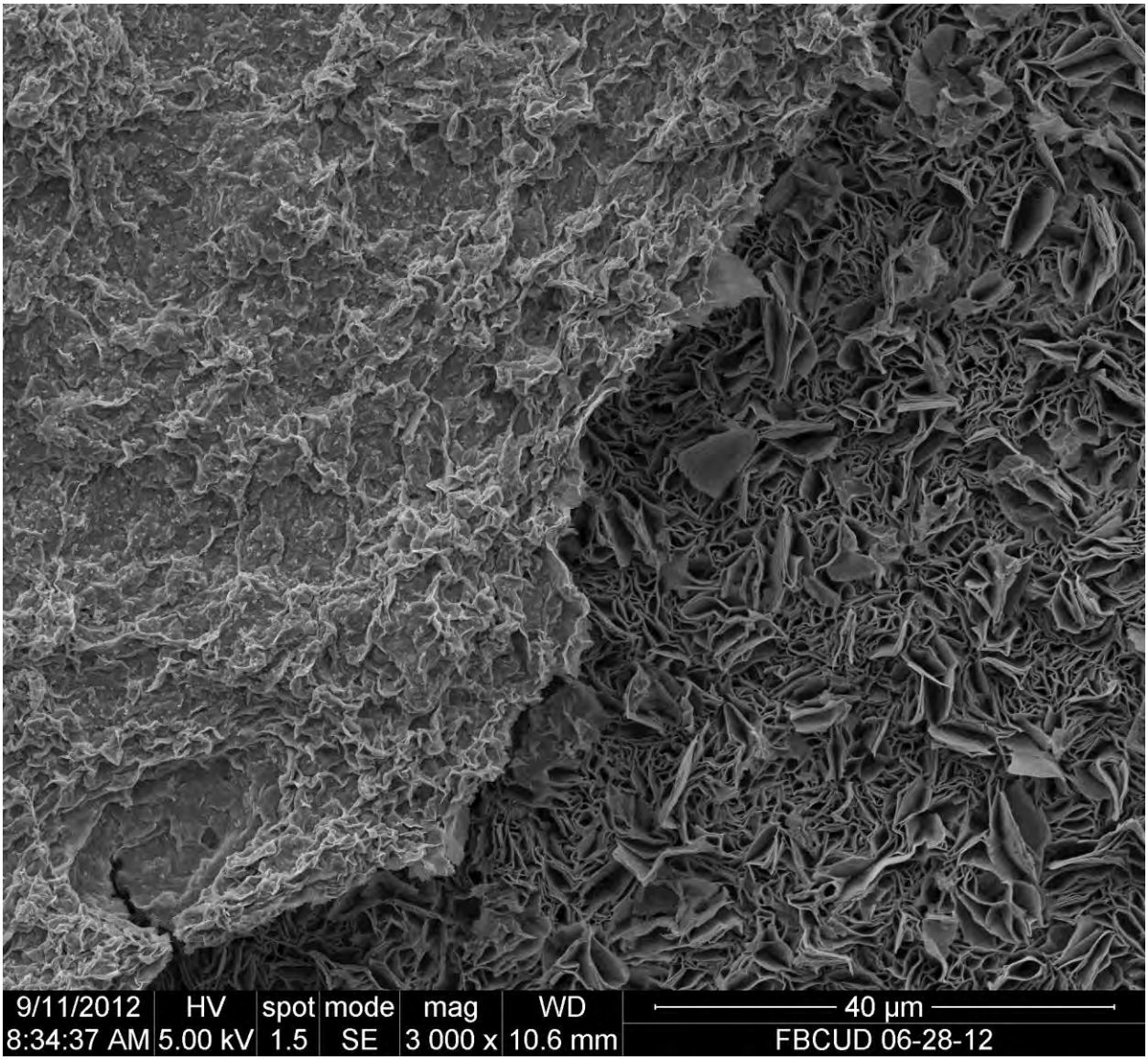
A.5-13: close up SEM image of plagioclase overgrowth from EBS 5



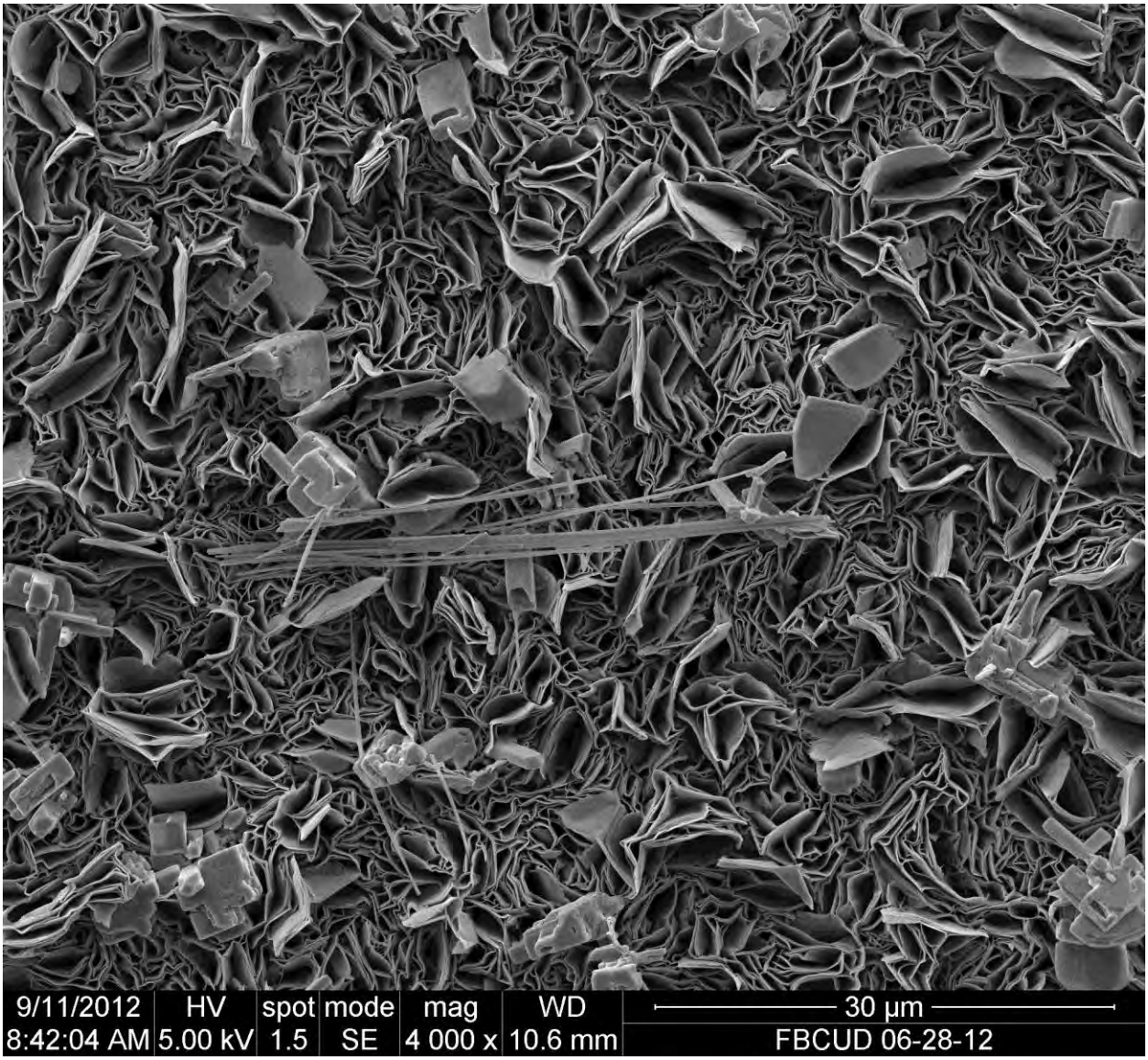
A.5-14: SEM image of non-terminated cubochtahedral Analcime



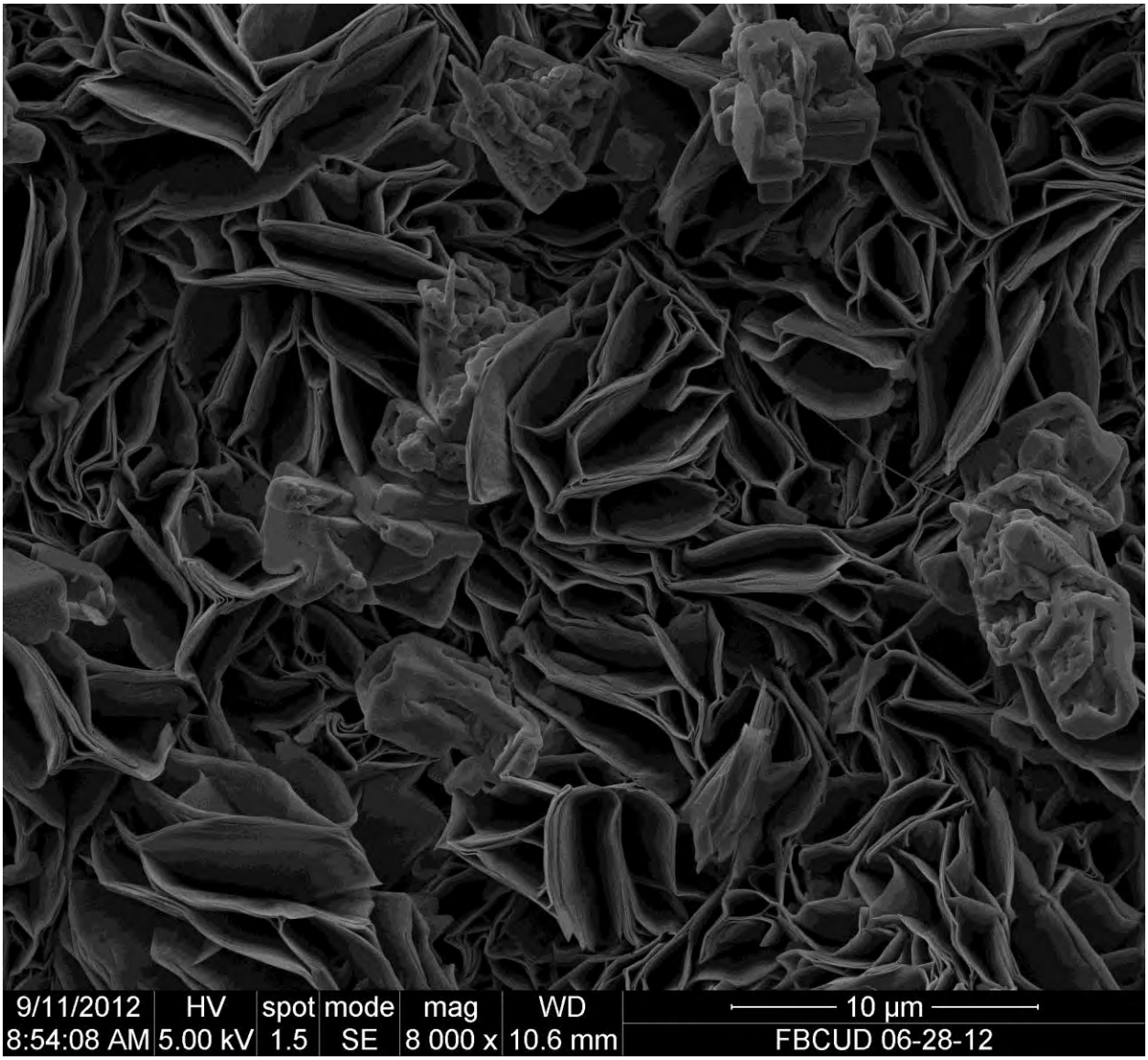
A.5-15: SEM image of euhedral faces on an Analcime from EBS 5



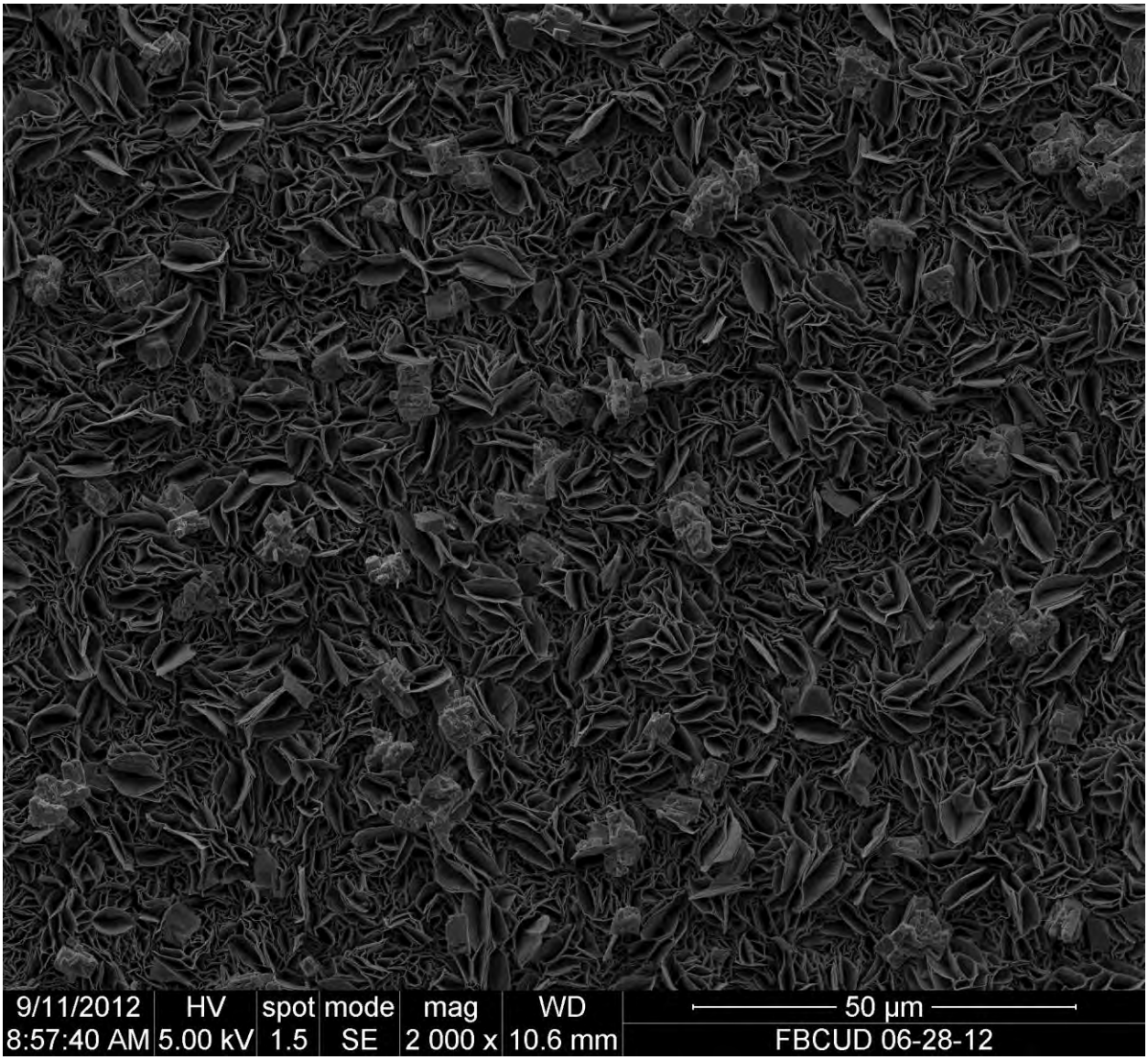
A.5-16: SEM image of smectite (left) overlying iron saponite (right) corrosion surface



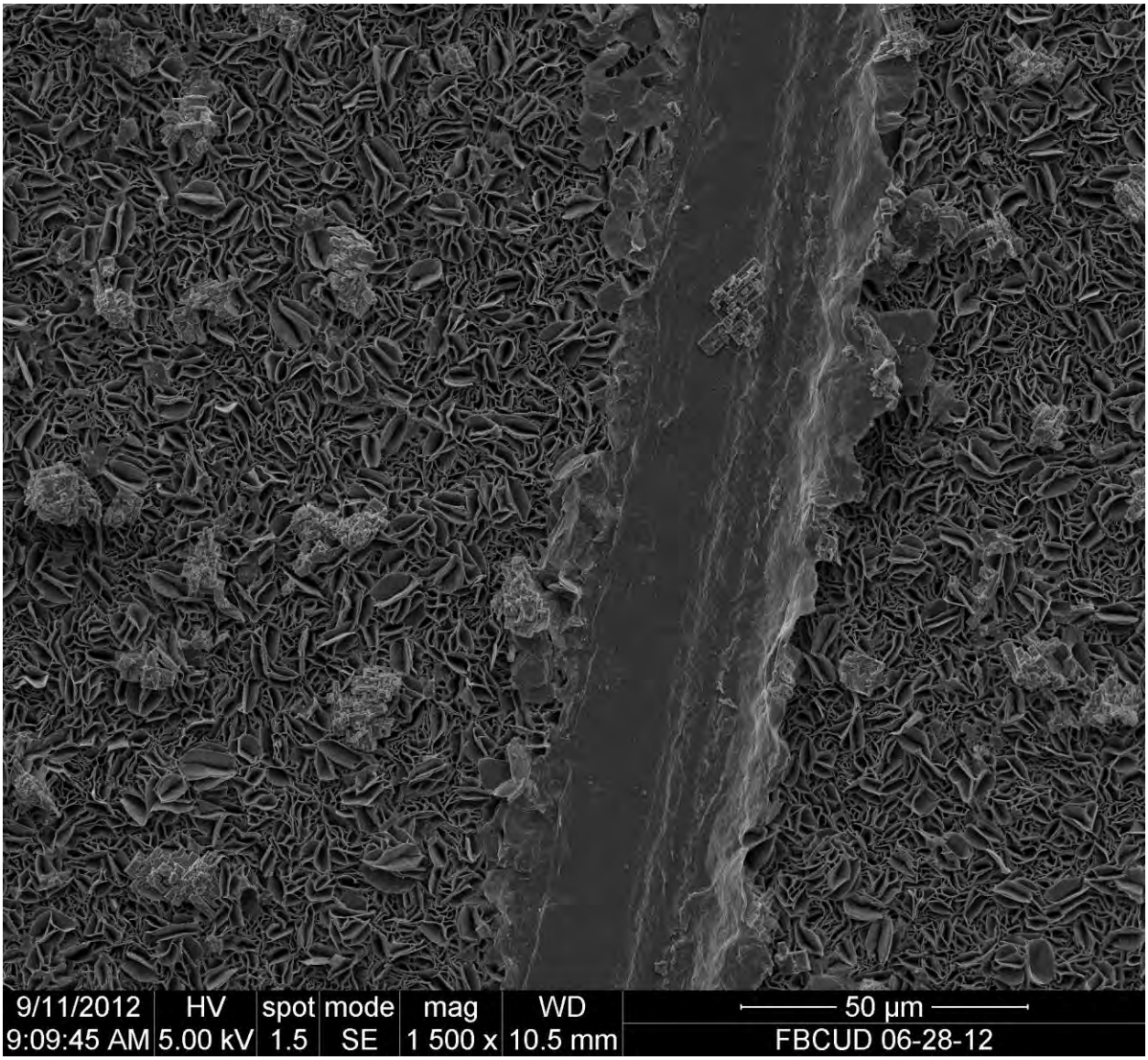
A.5-17: SEM image of pentlandite within saponite corrosion surface on 304 Stainless steel



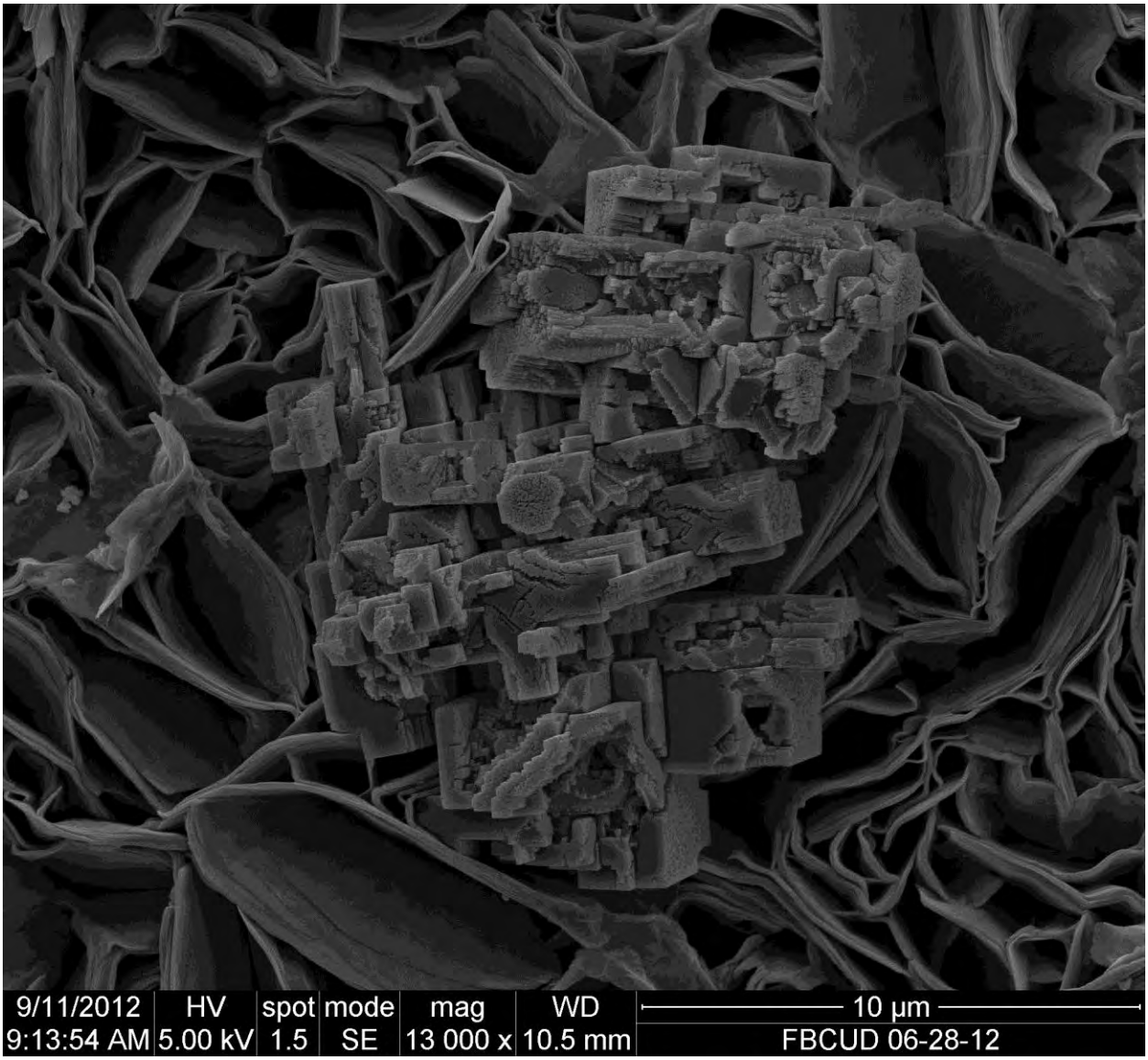
A.5-18: SEM image of iron saponite corrosion surface



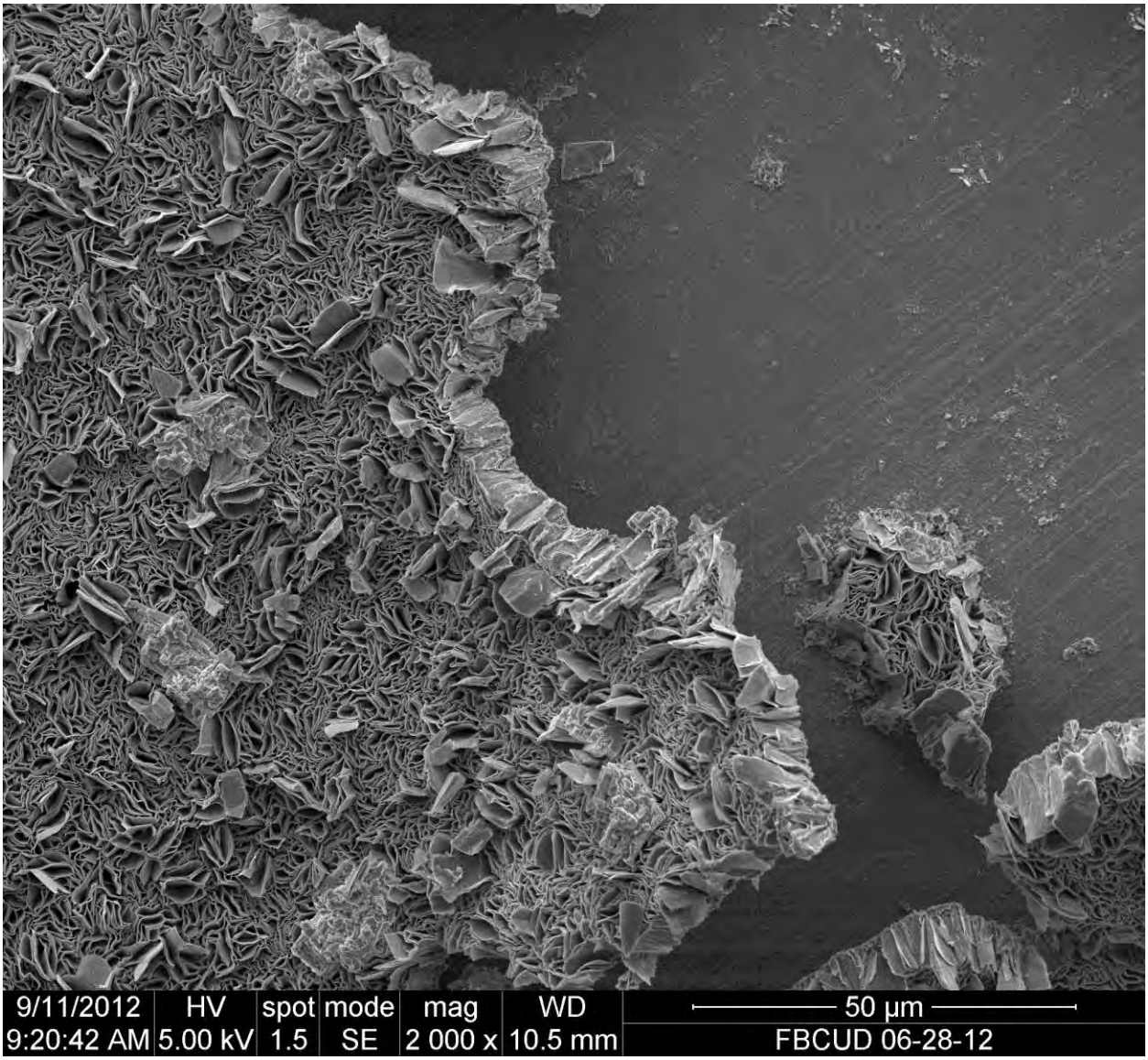
A.5-19: SEM image of 304 Stainless Steel overlain by Fe-saponite



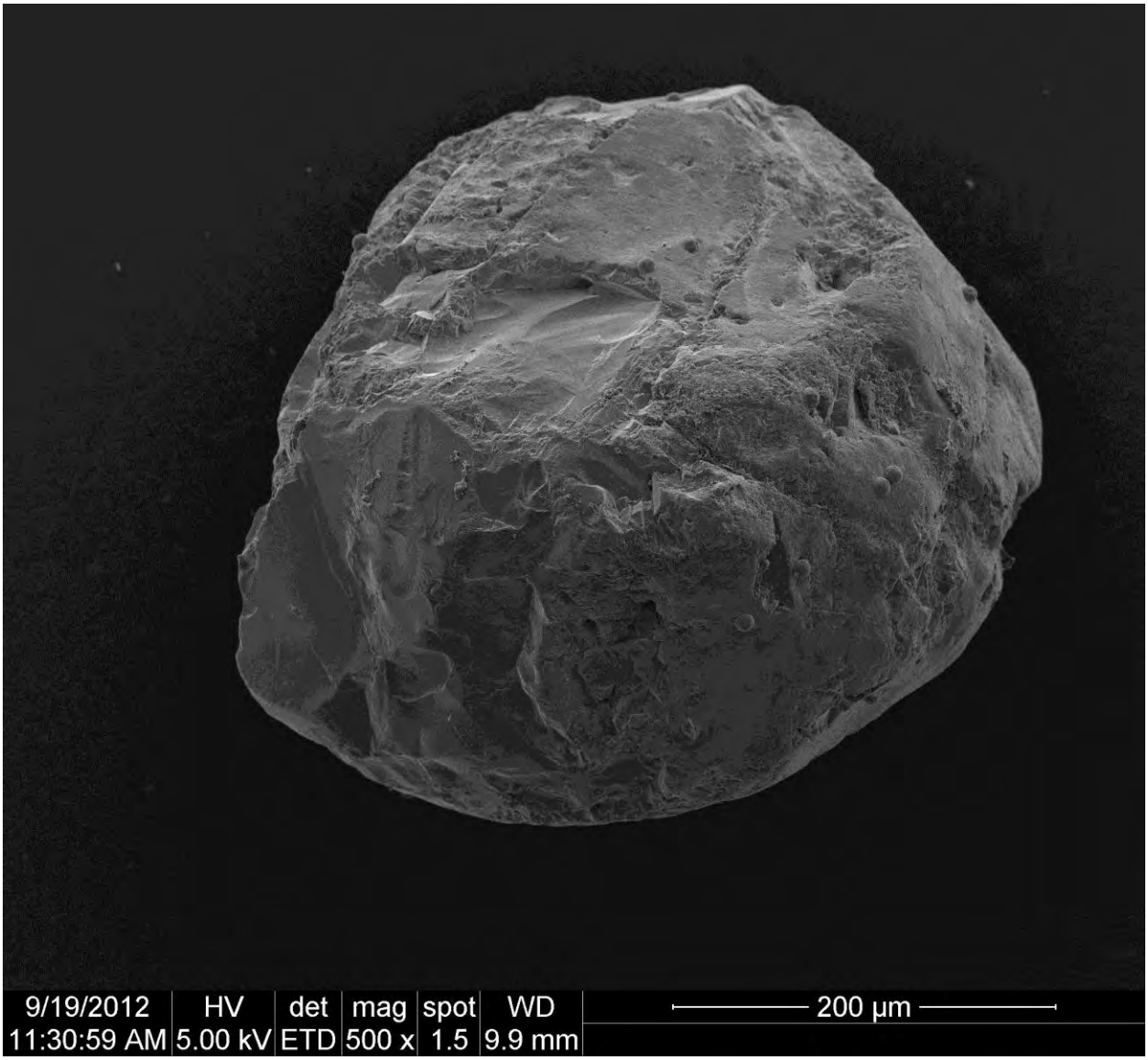
A.5-20: SEM image of scratch through saponite layer



A.5-21: SEM image of unknown sulfide hopper in Fe-saponite bed

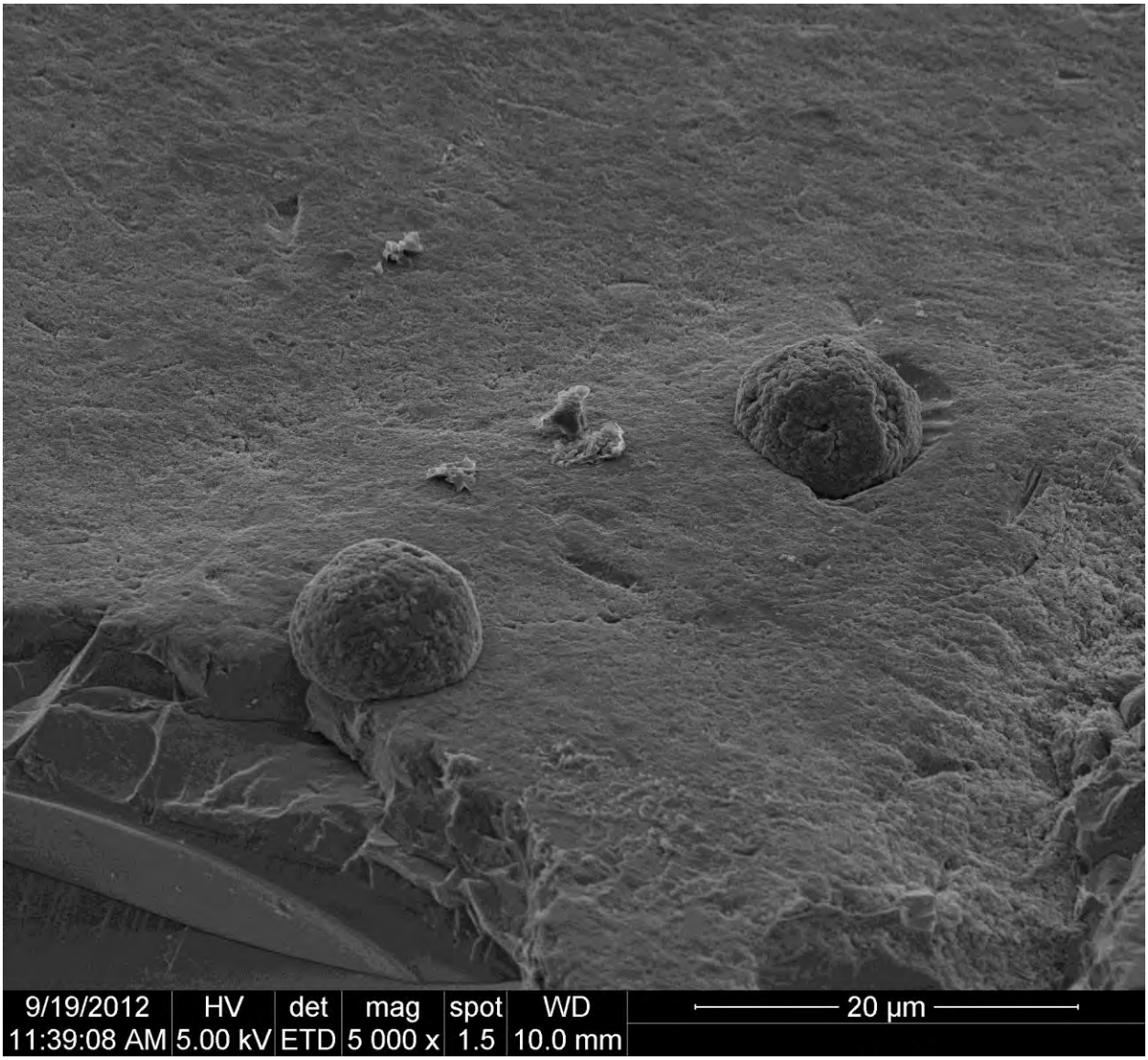


A.5-22: SEM image of iron saponite interface growth (left) overlying 304 Stainless Steel (right)

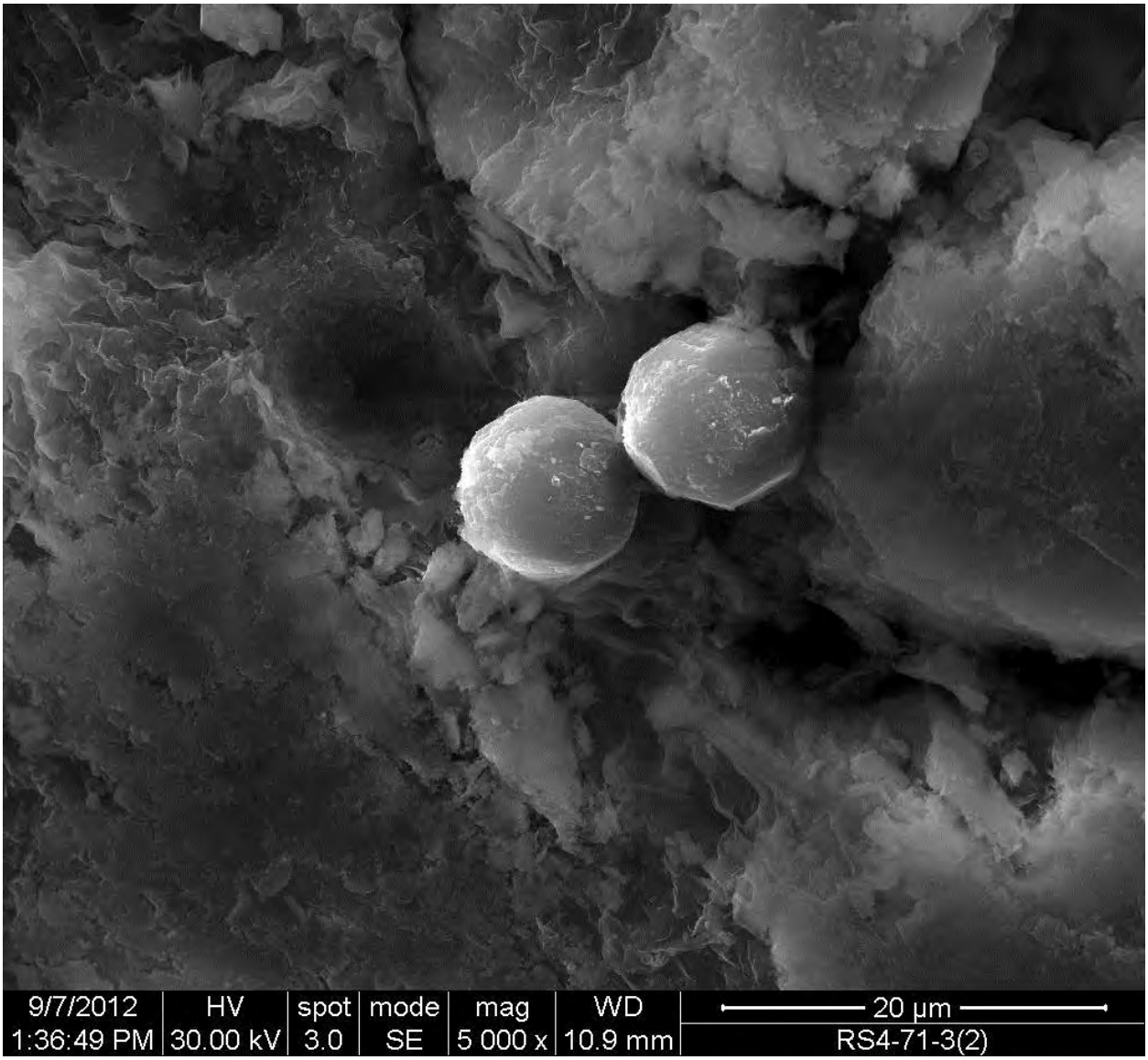


A.5-23: SEM image of chromite grain

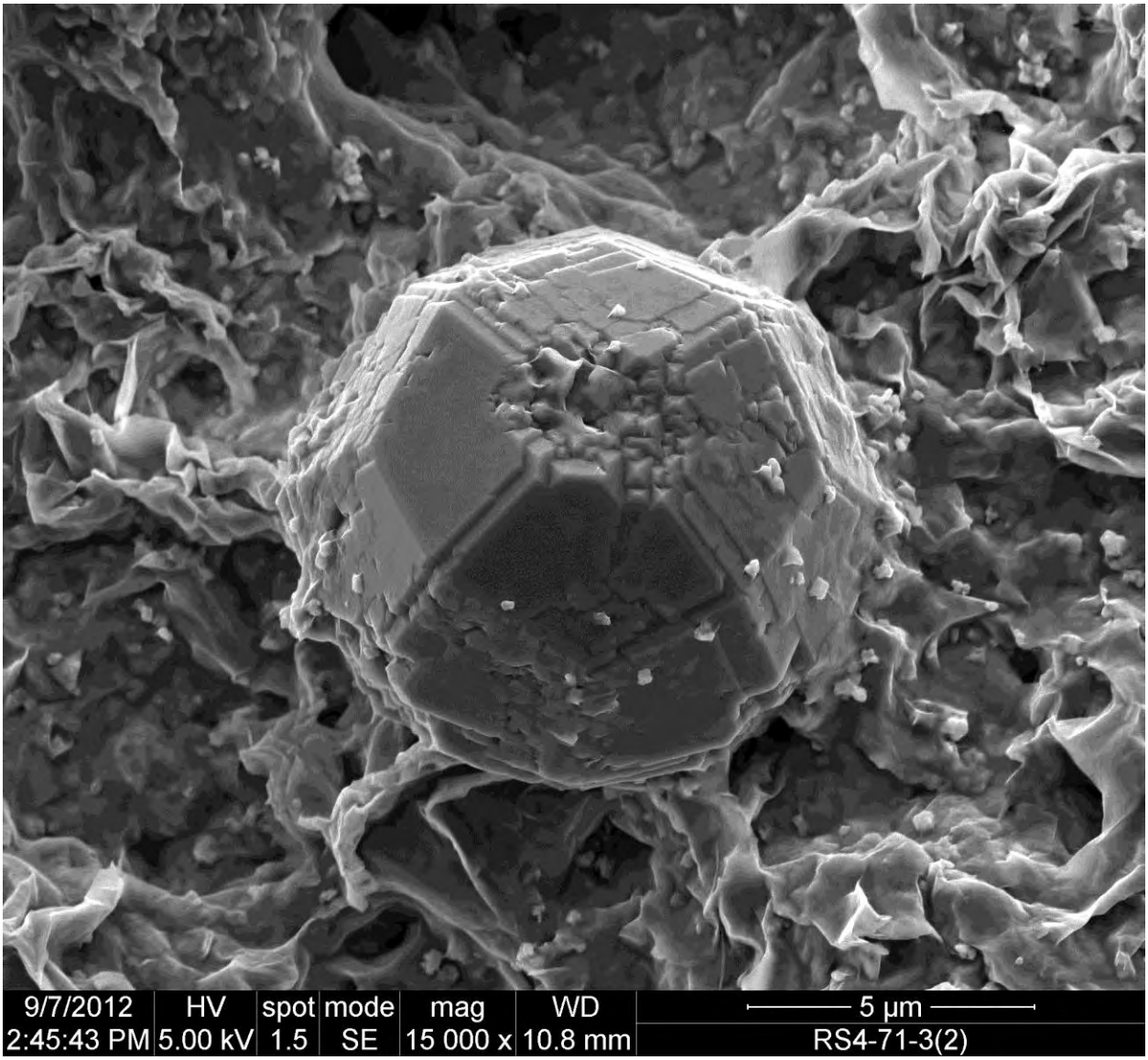
A.5-24: close up SEM image of Analcime on chromite



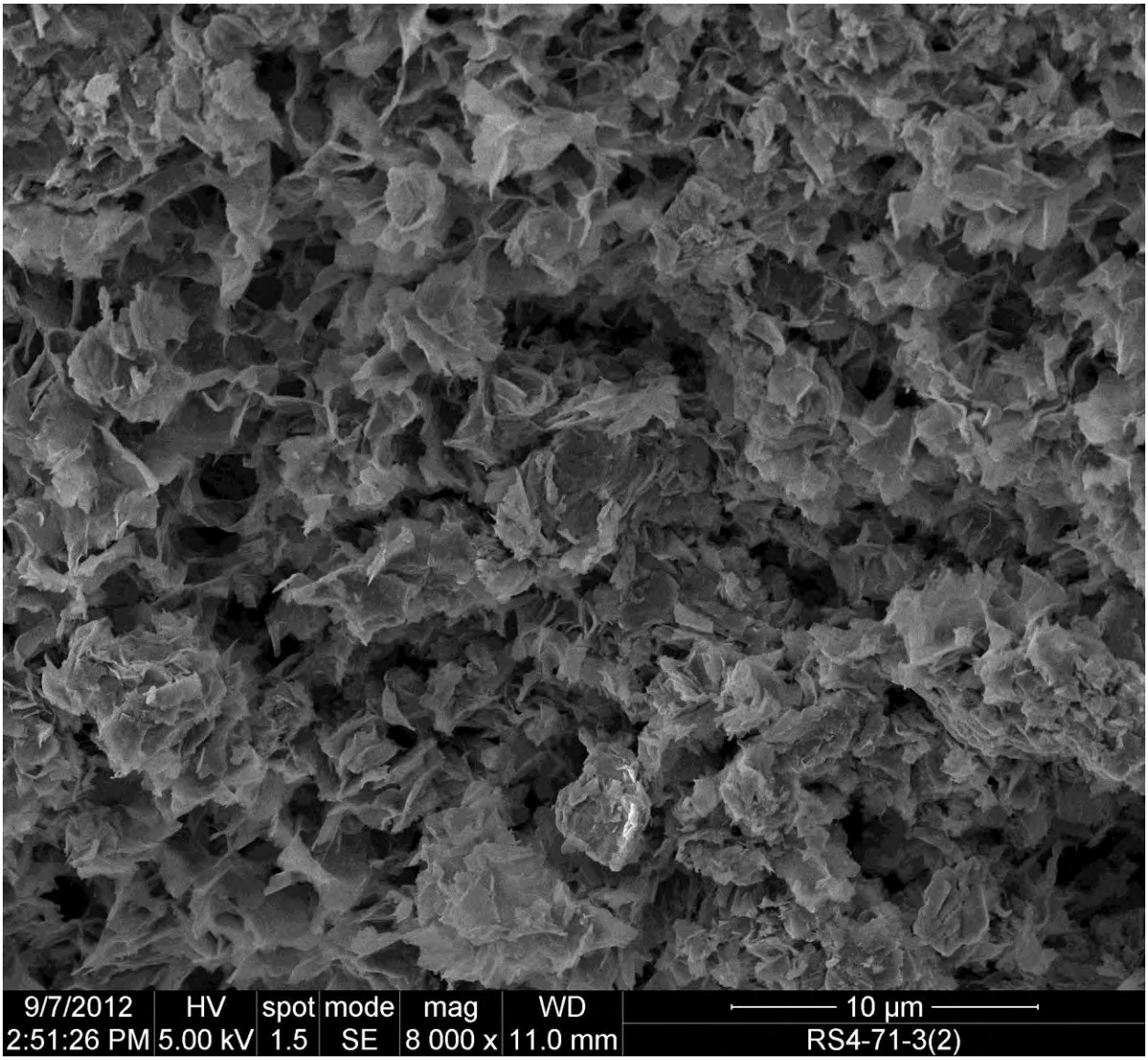
A.5-25: SEM image of Analcime on chromite



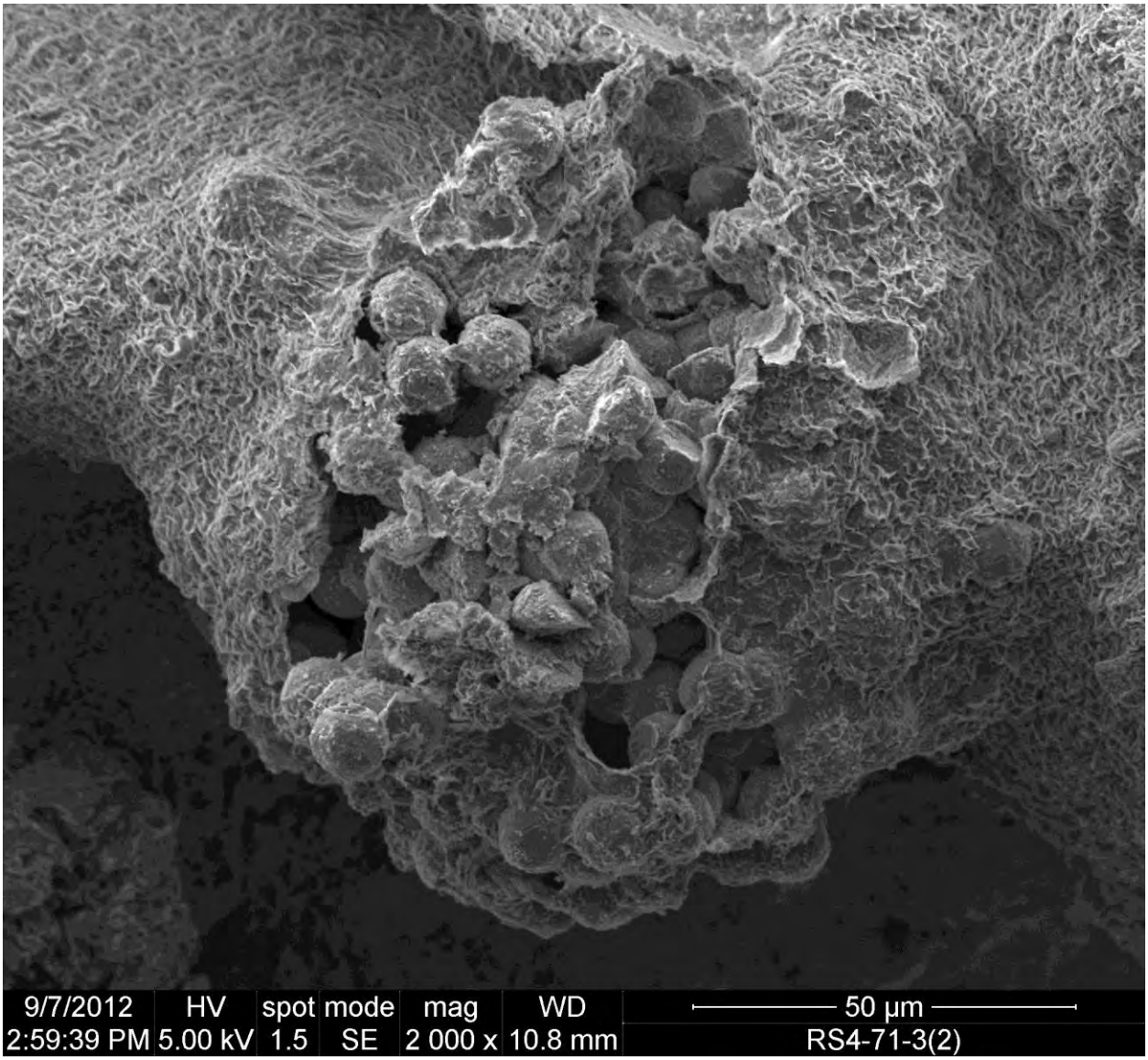
A.5-26: SEM image of cristobolite spheres



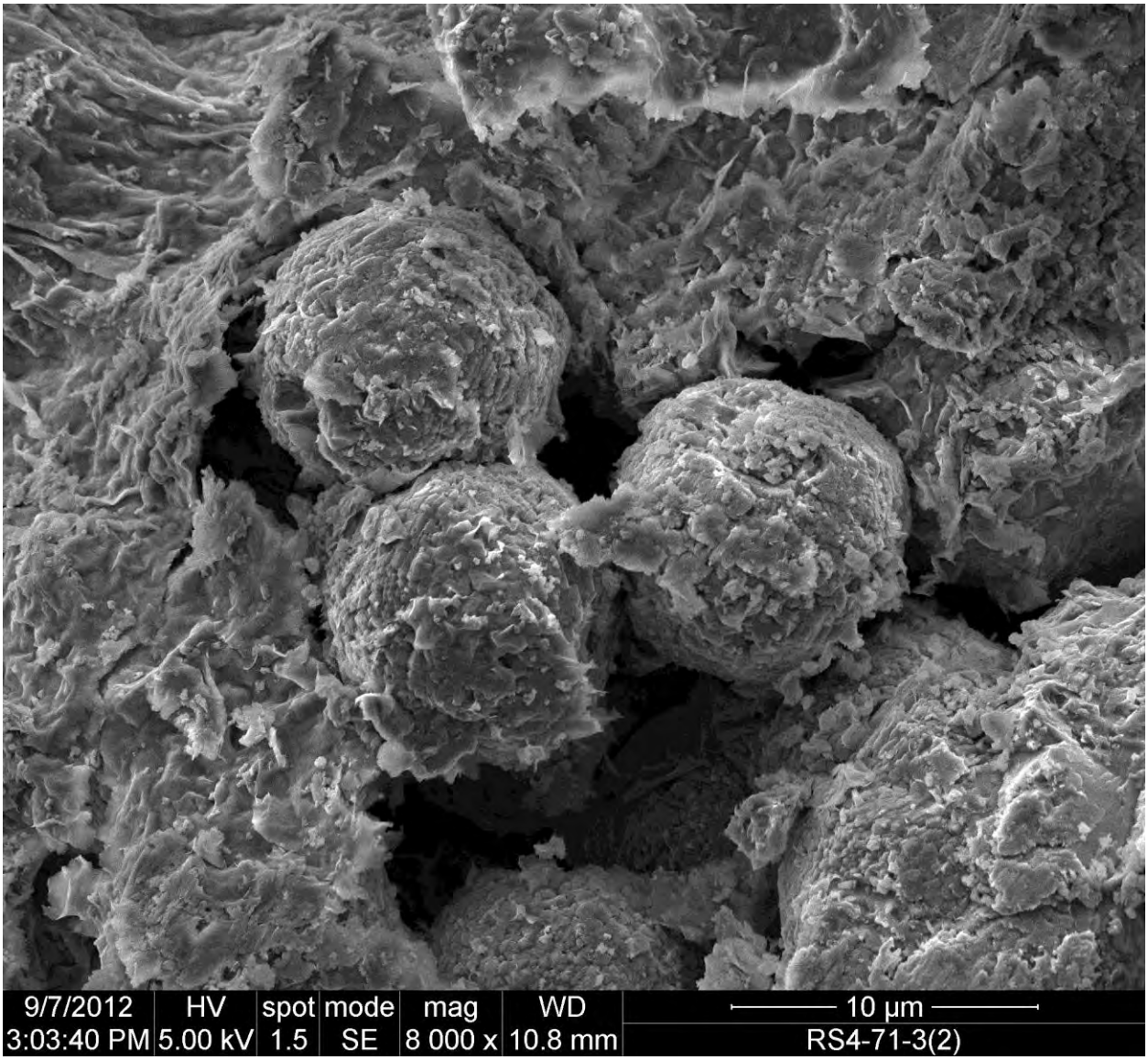
A.5-27: SEM image of euhedral Analcime on smectite



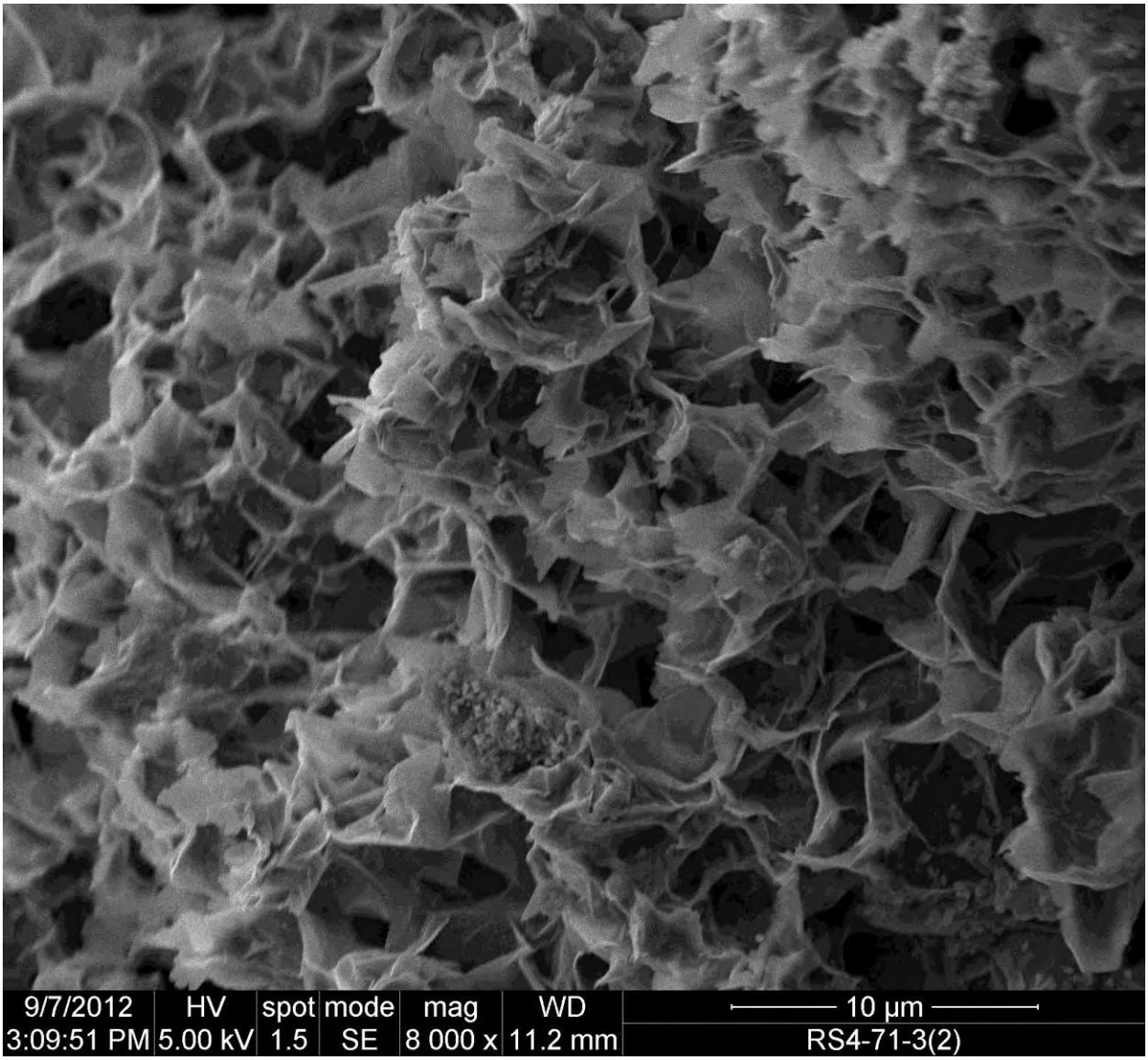
A.5-28: SEM image of slightly corroded semectite from EBS 5



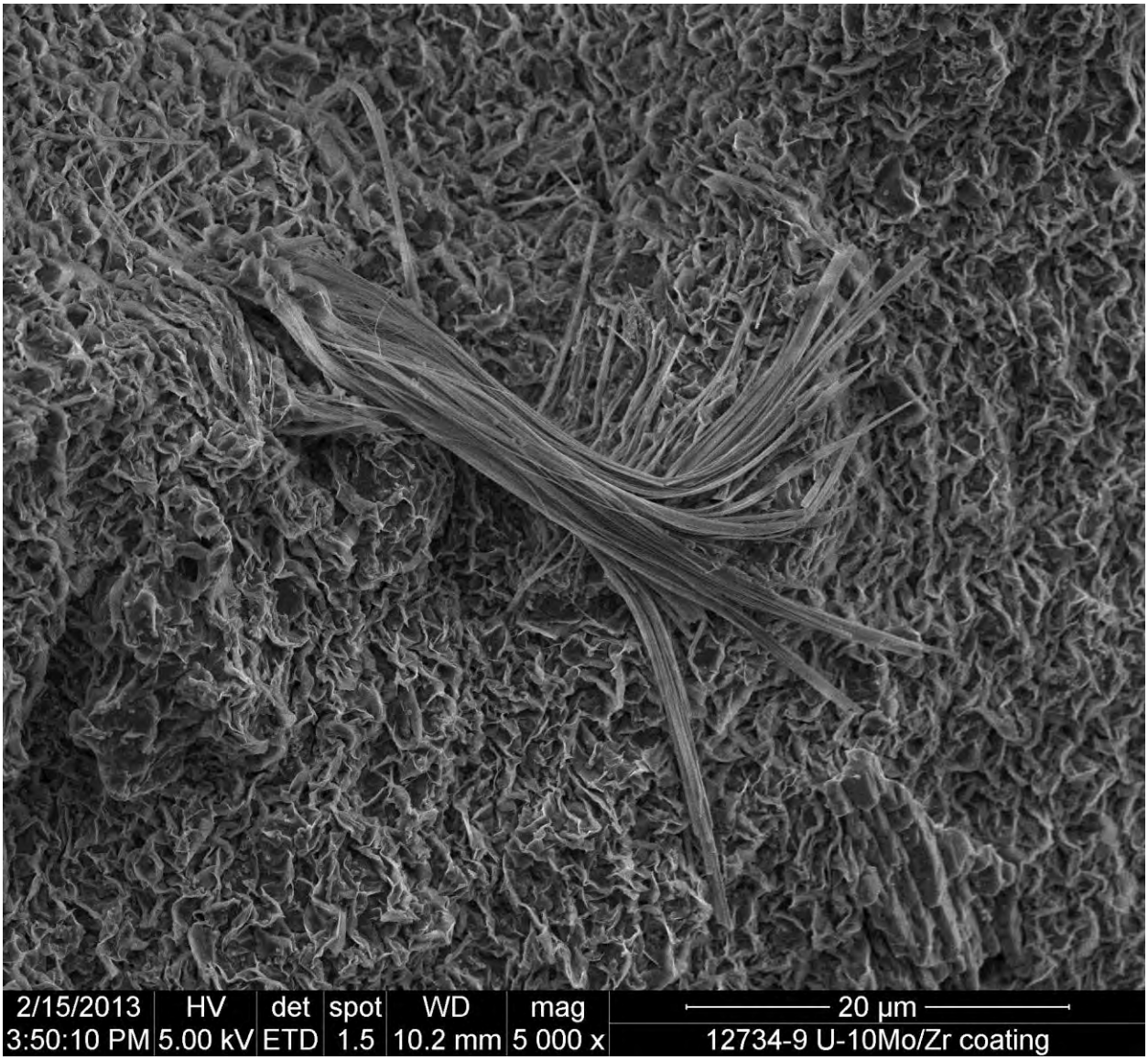
A.5-29: SEM image of Analcime replacing pumice lapilli



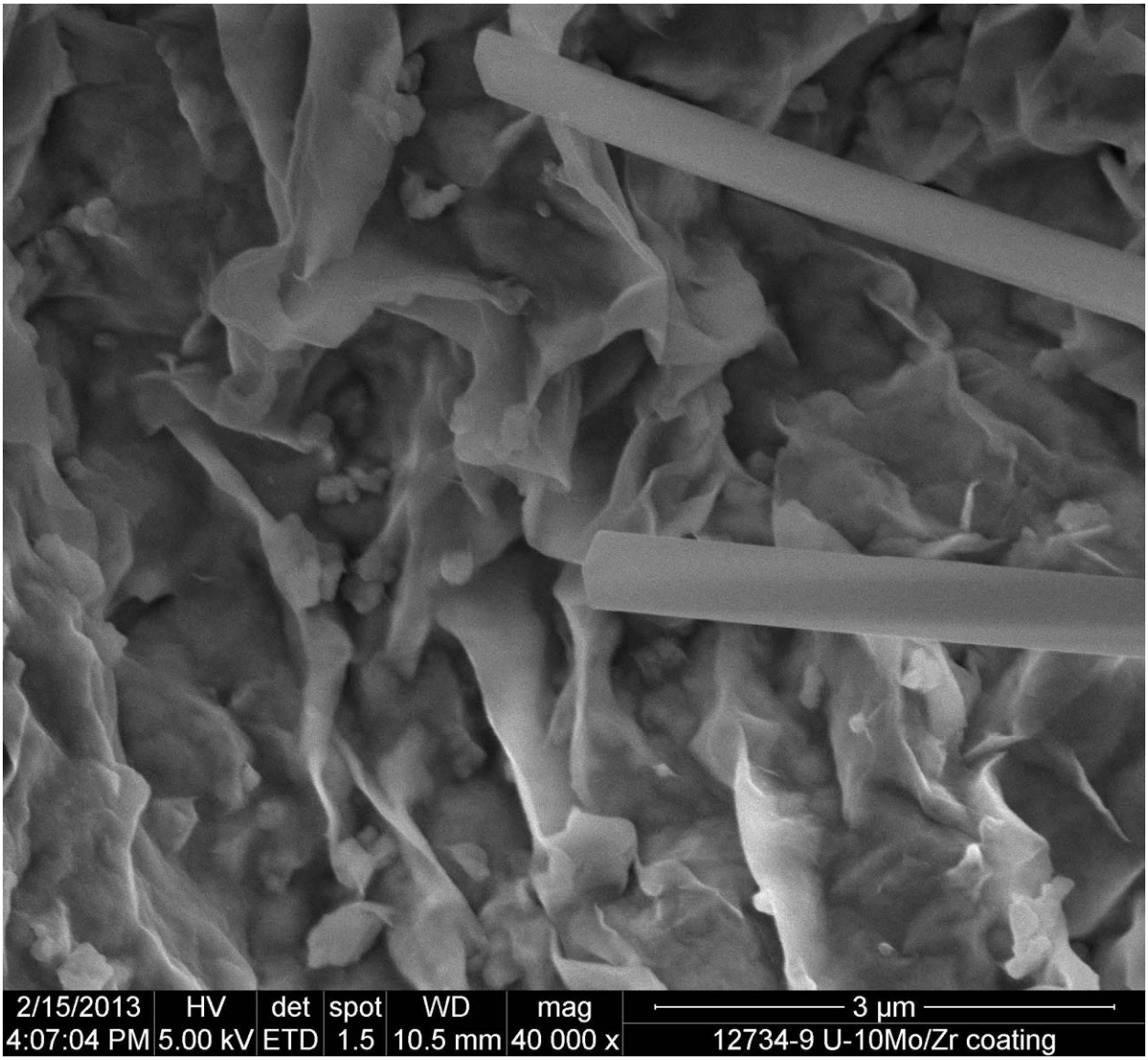
A.5-30: SEM image of Analcime replacing pumice lapilli



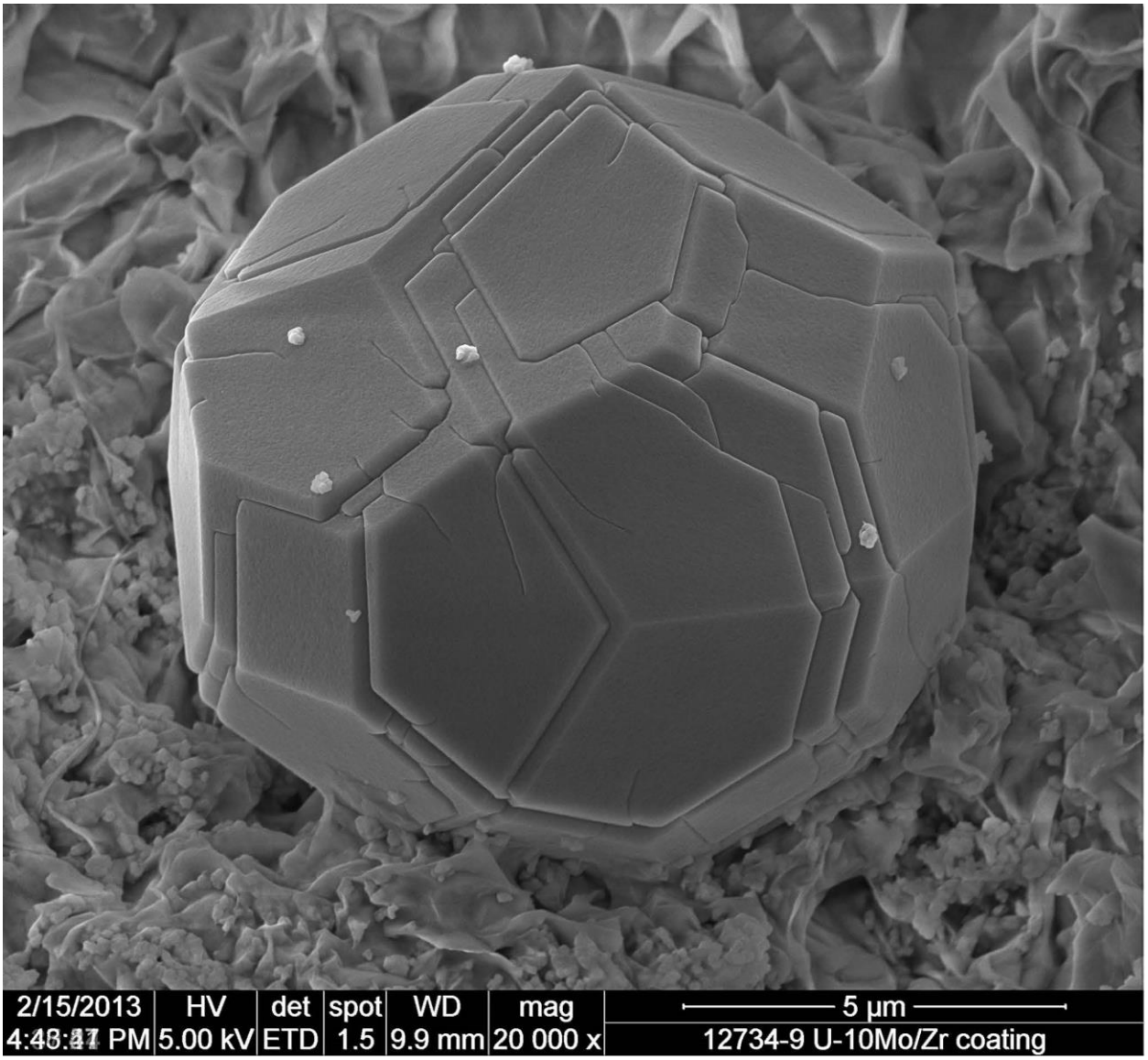
A.5-31: SEM image of smectite from EBS 5



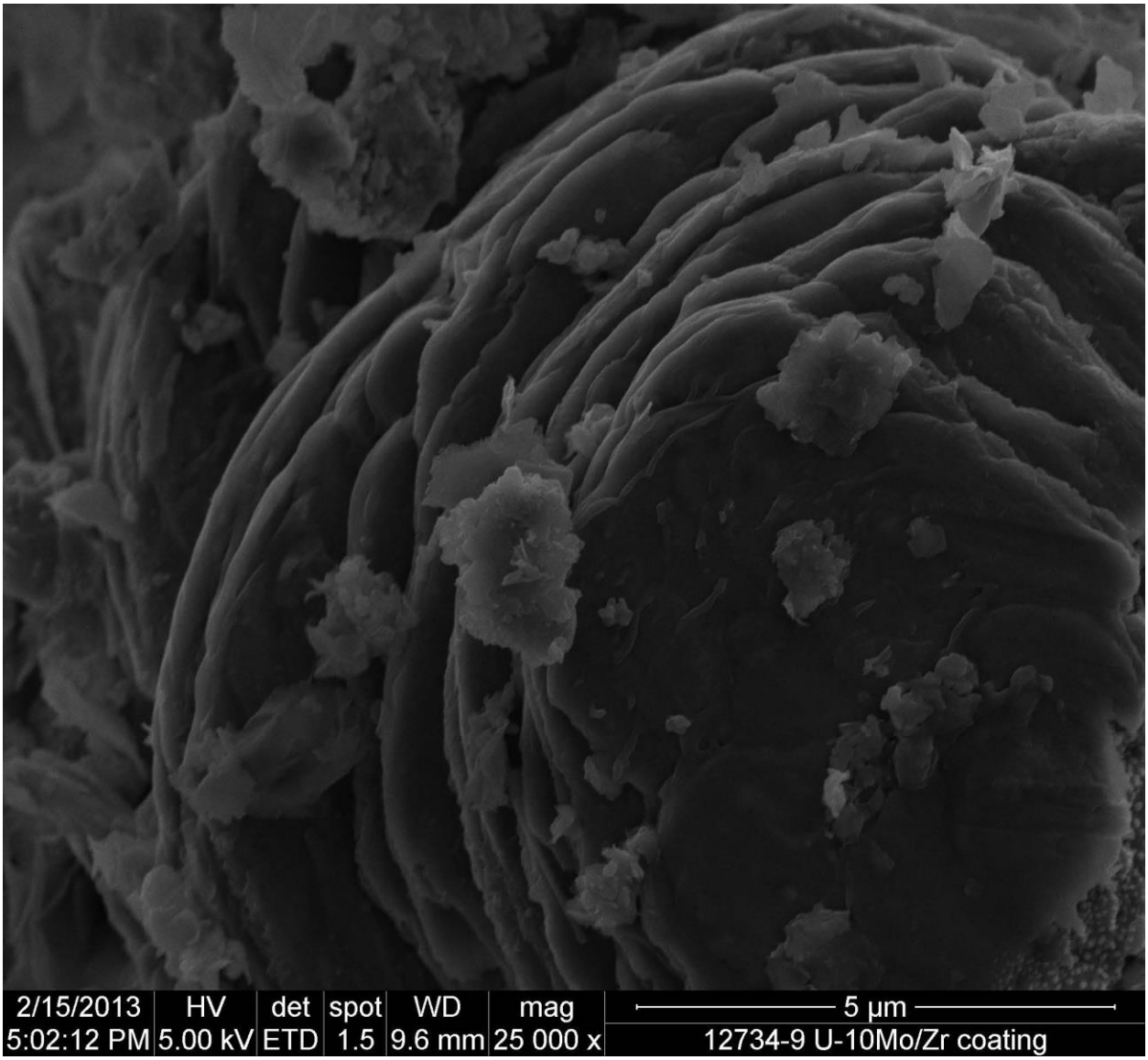
A.5-32: SEM image of illite primary spray on smectite from EBS 5



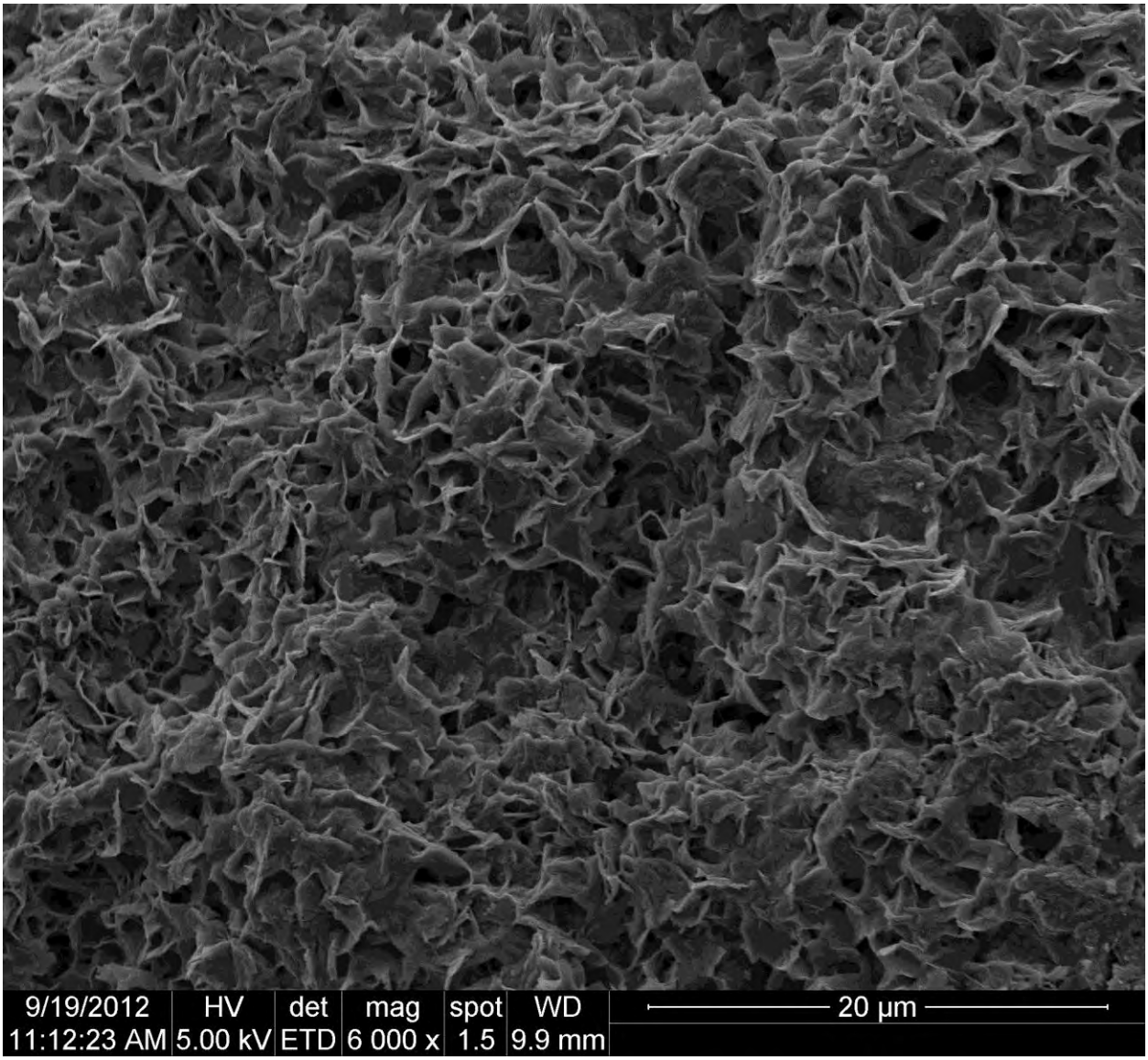
A.5-33: SEM image of termination unknown zeolite acicular crystals



A.5-34: SEM image of Analcime in EBS 5 smectite matrix



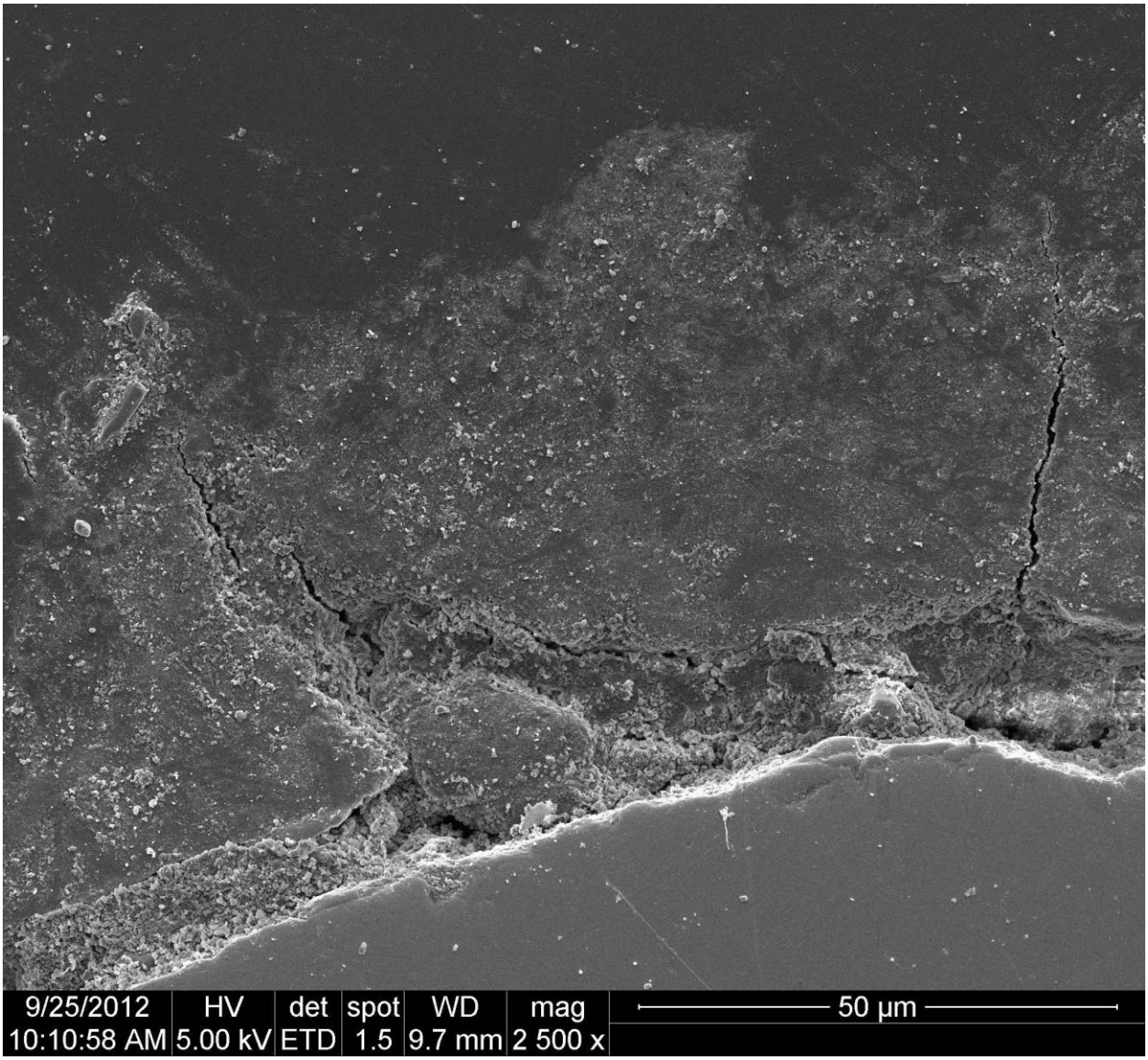
A.5-35: SEM image of late stage opal on smectite



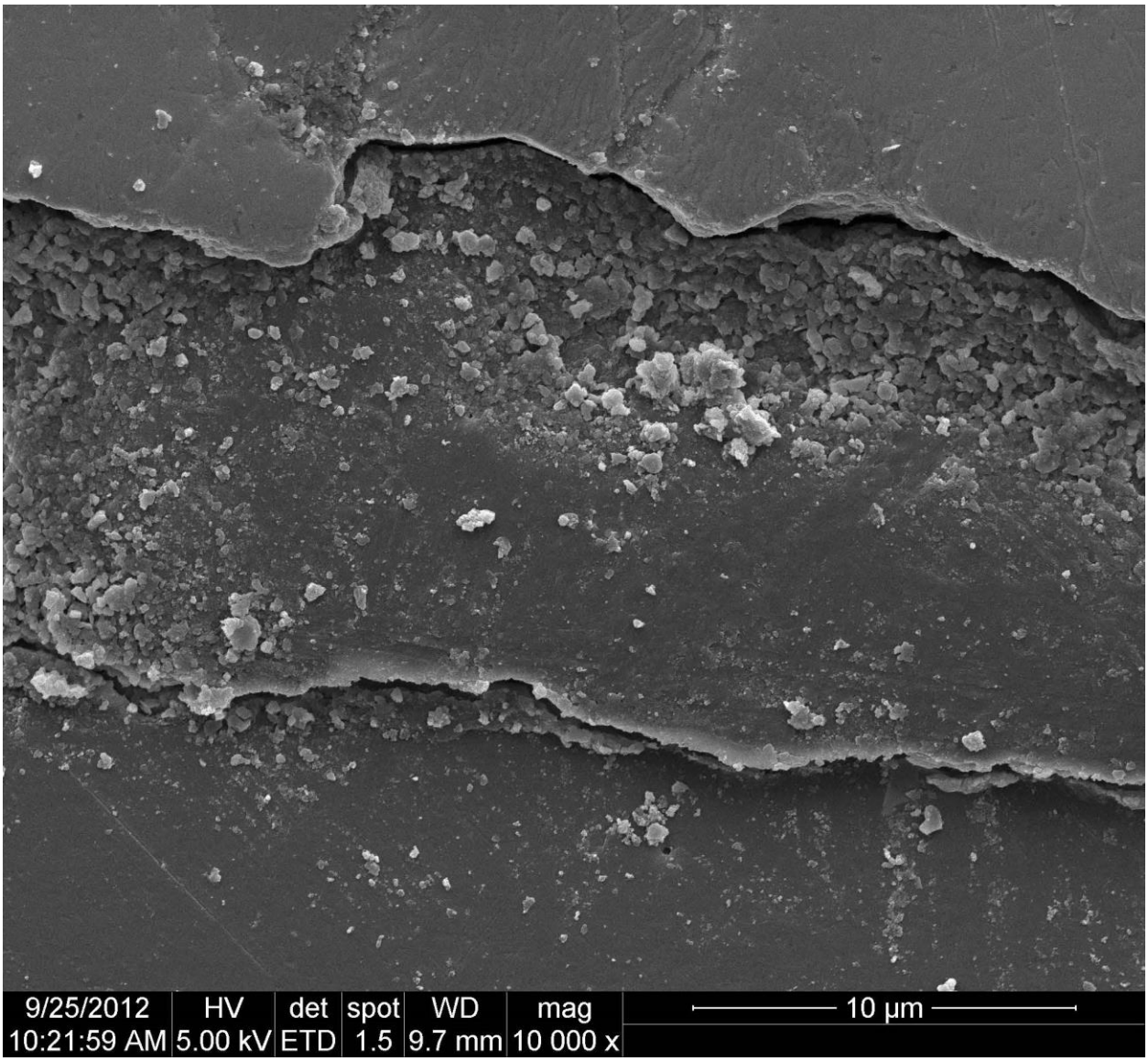
A.5-36: close up SEM image of smectite from EBS 5

Appendix A.6

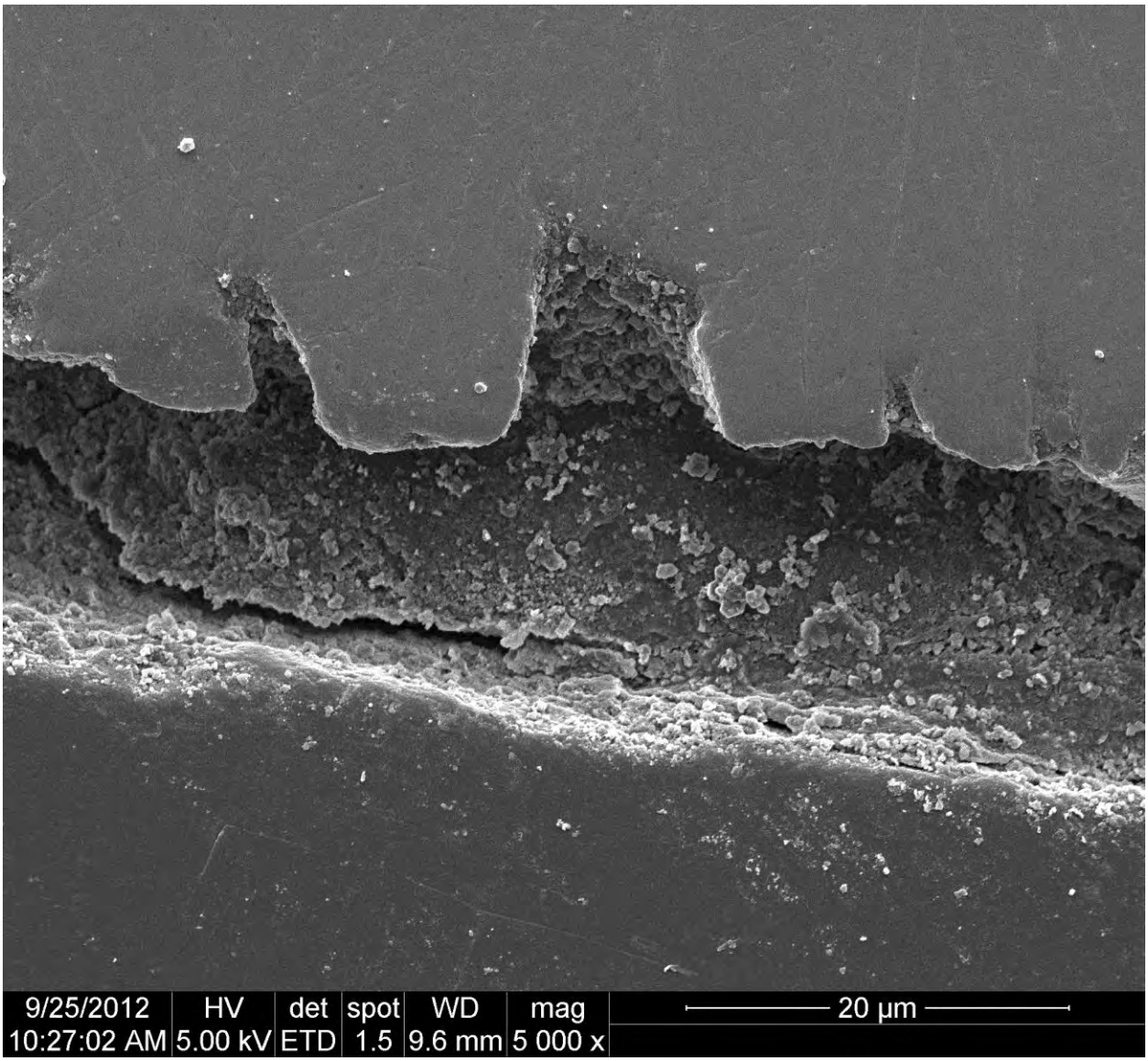
EBS-6 Step temperature increase (100, 200, 300 ^{o}C) at 150 bar for 5 weeks run with Low Carbon Steel



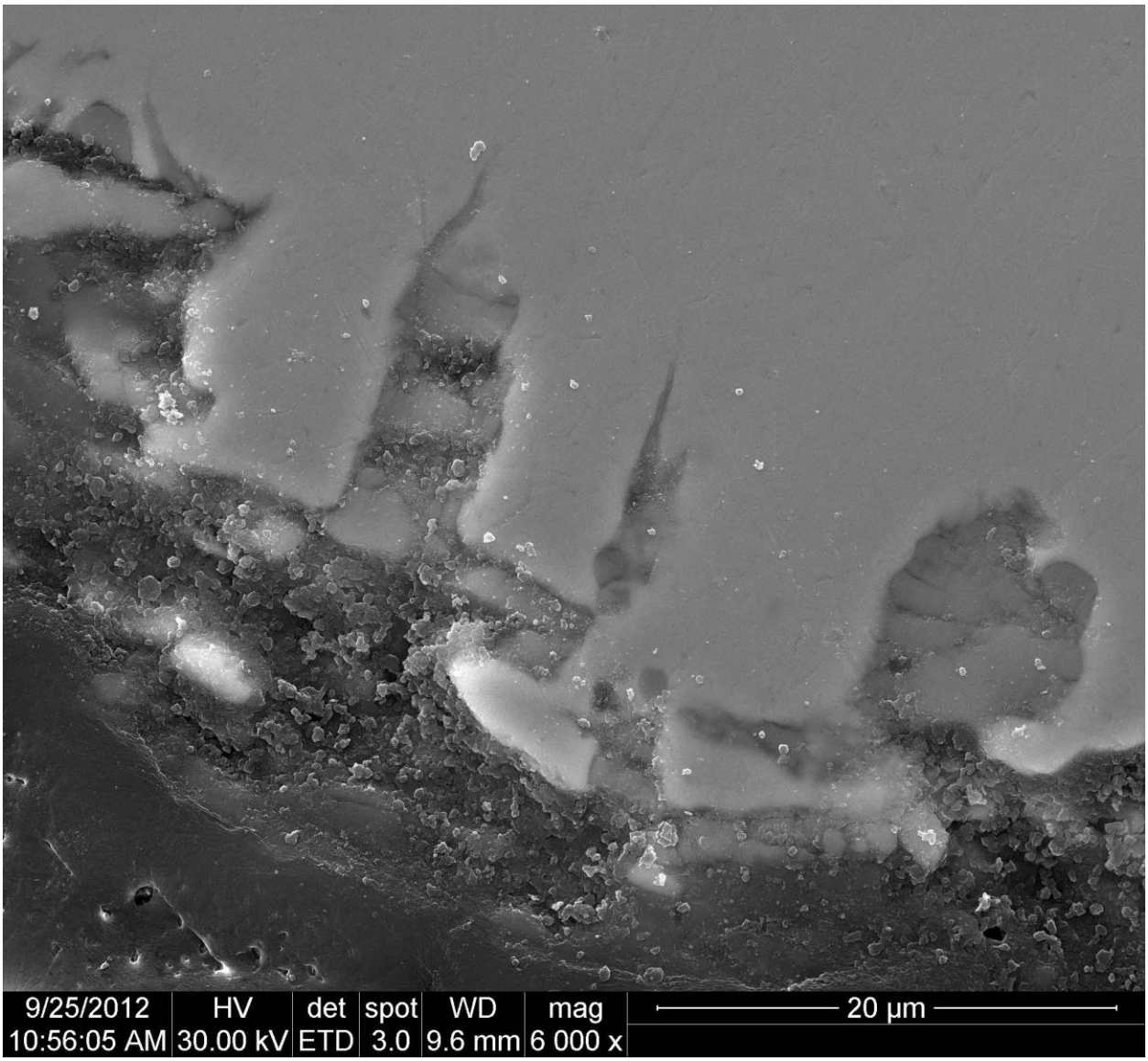
A.6-1 Back Scattered image of low carbon stainless steel (bottom) saponite border (top)



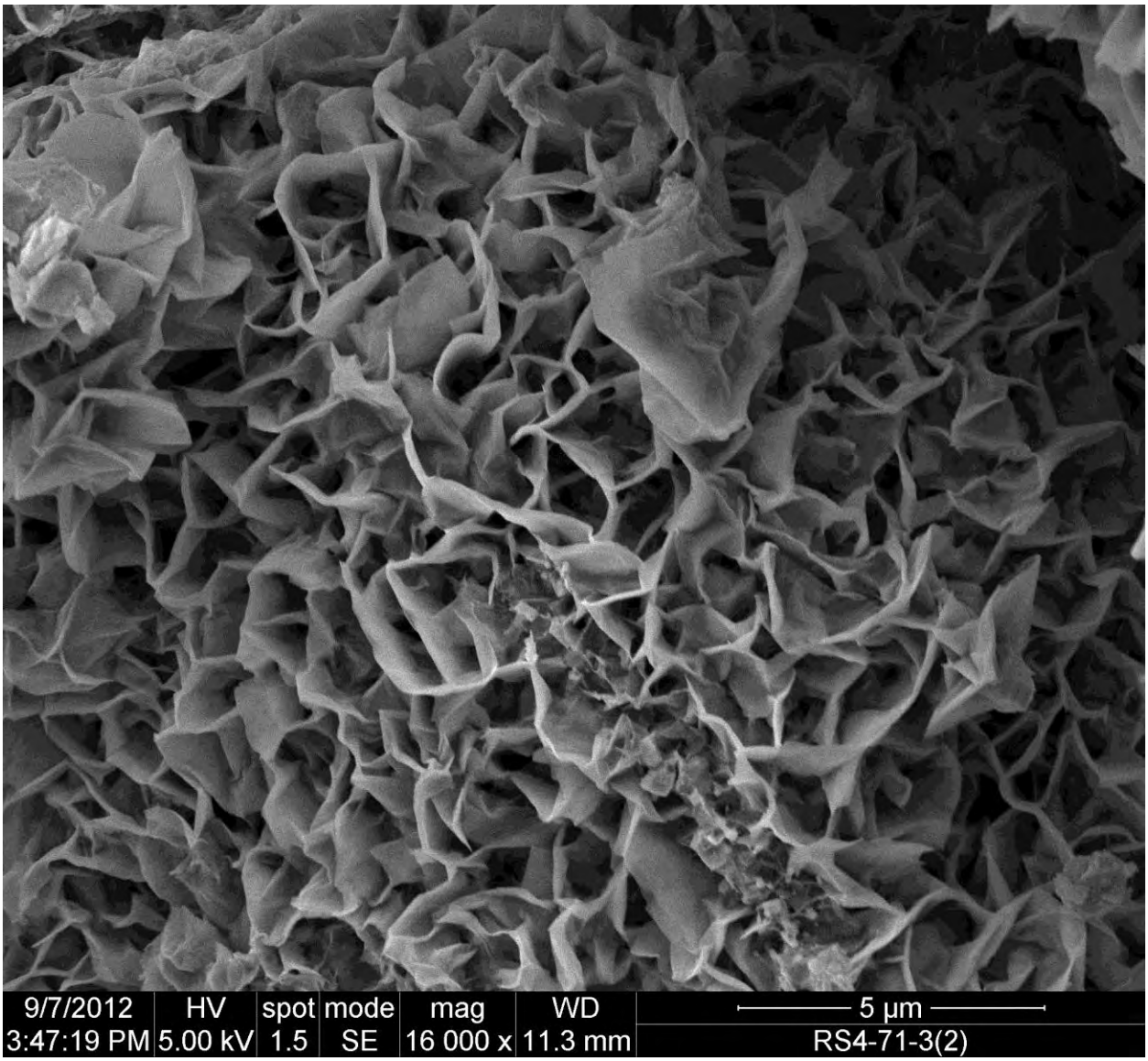
A.6-2 Back Scattered image of low carbon stainless steel (top) saponite border (bottom)



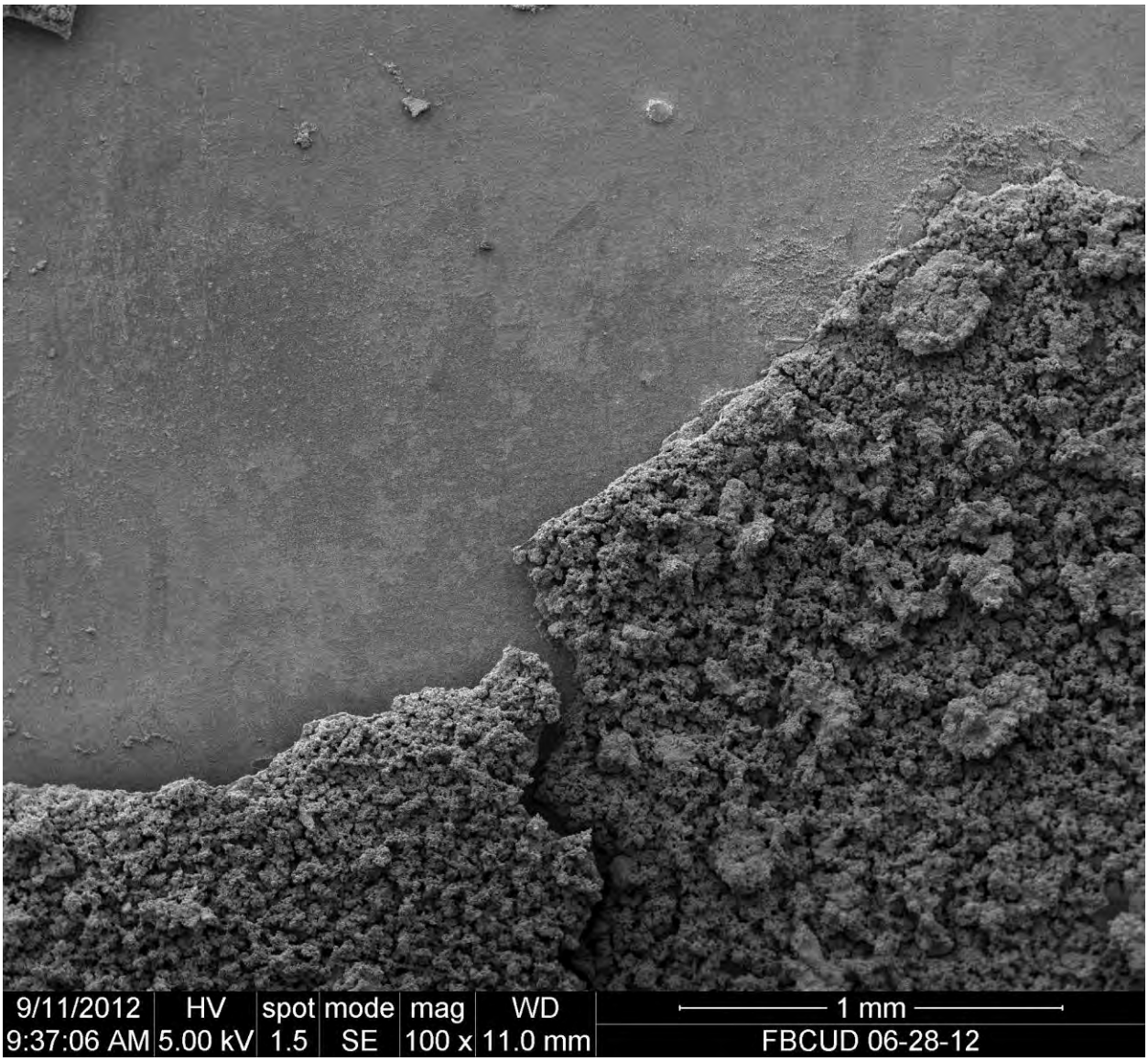
A.6-3 Back Scattered image of Fe-saponite within low carbon stainless steel crack



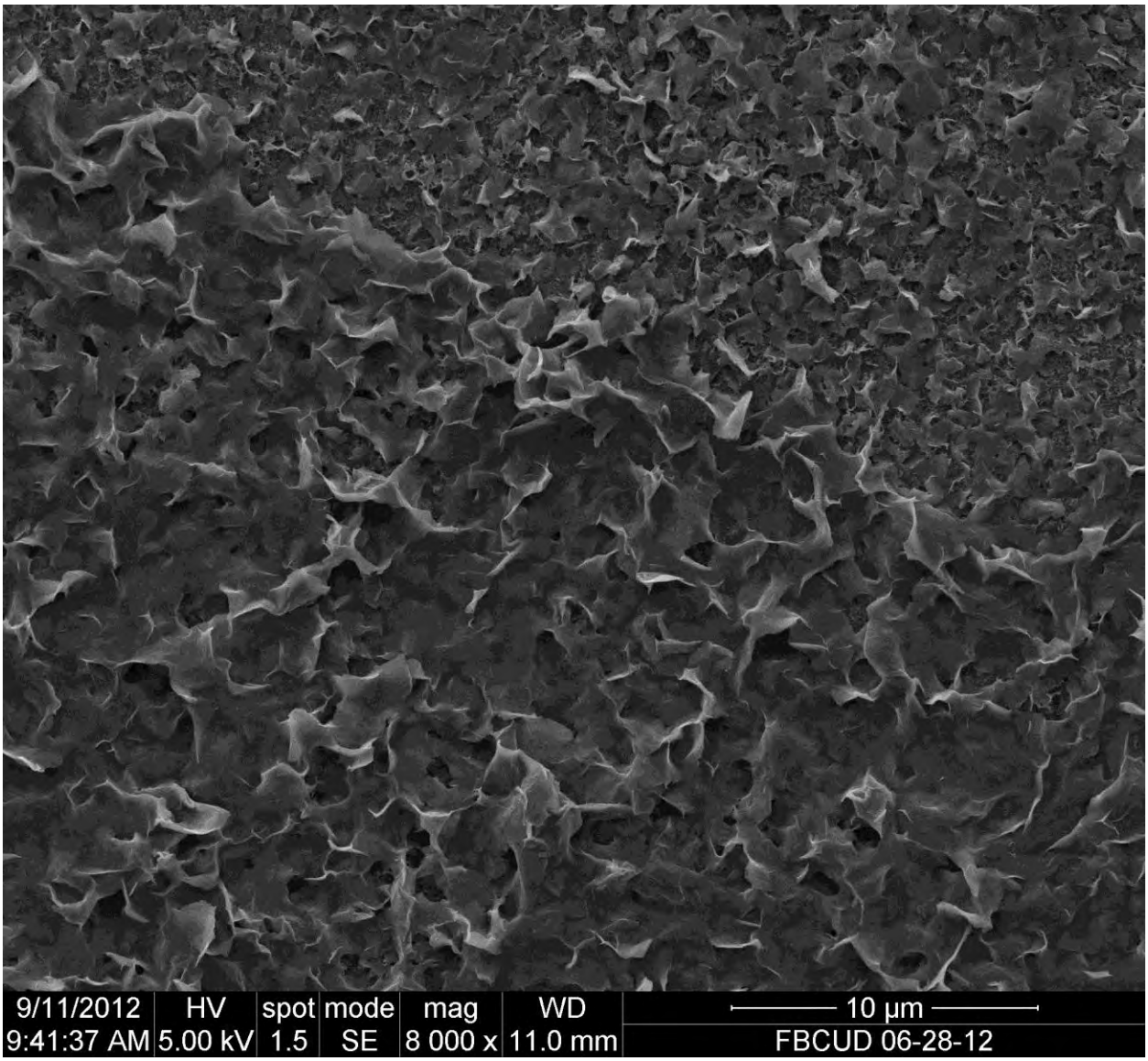
A.6-4 Back Scattered image of low carbon stainless steel pit and crack corrosion from EBS 6



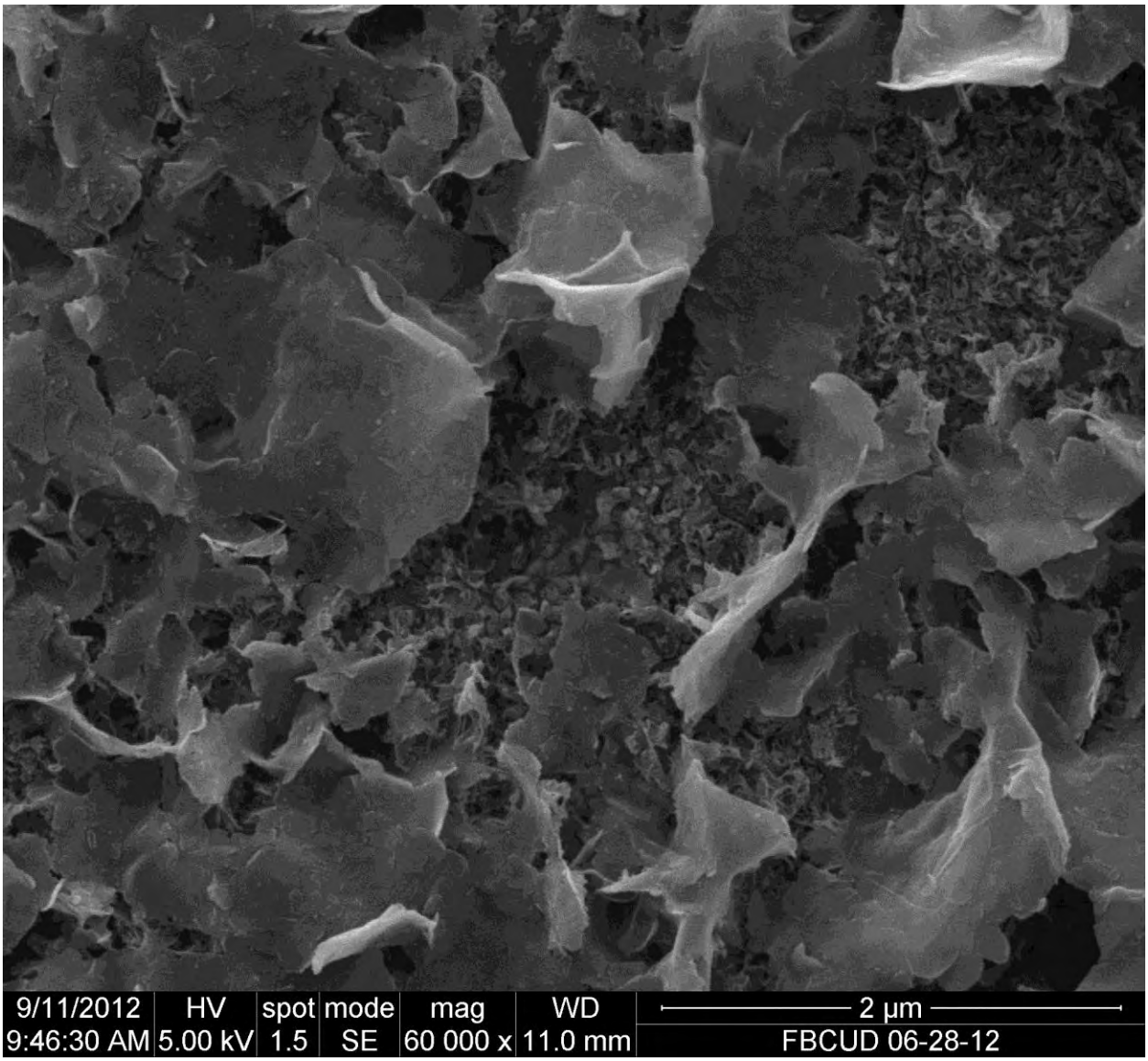
A.6-5: SEM image of corrosion strip in smectite



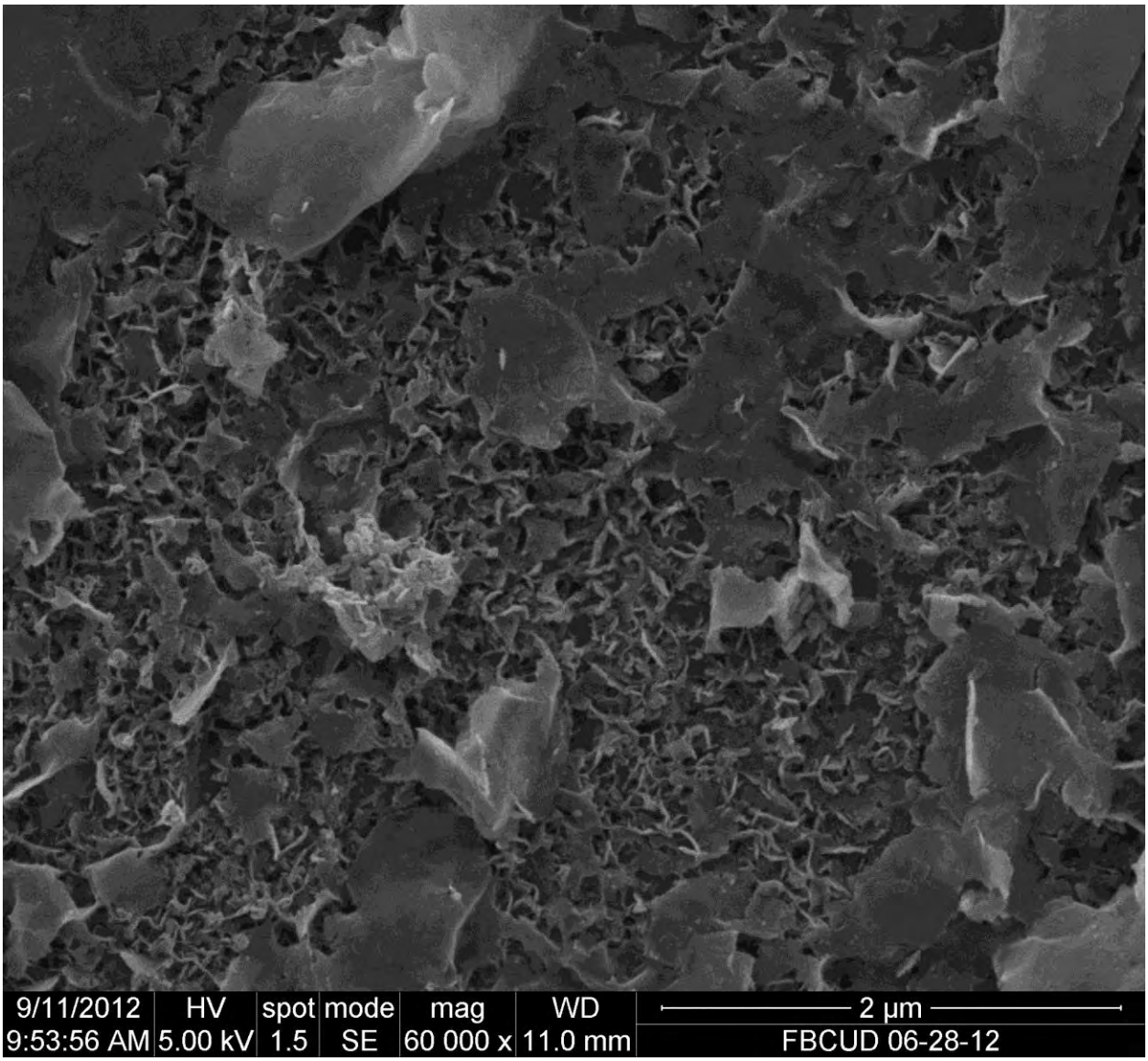
A.6-6: SEM image of low carbon stainless steel (upper left) and interface saponite alteration (lower right)



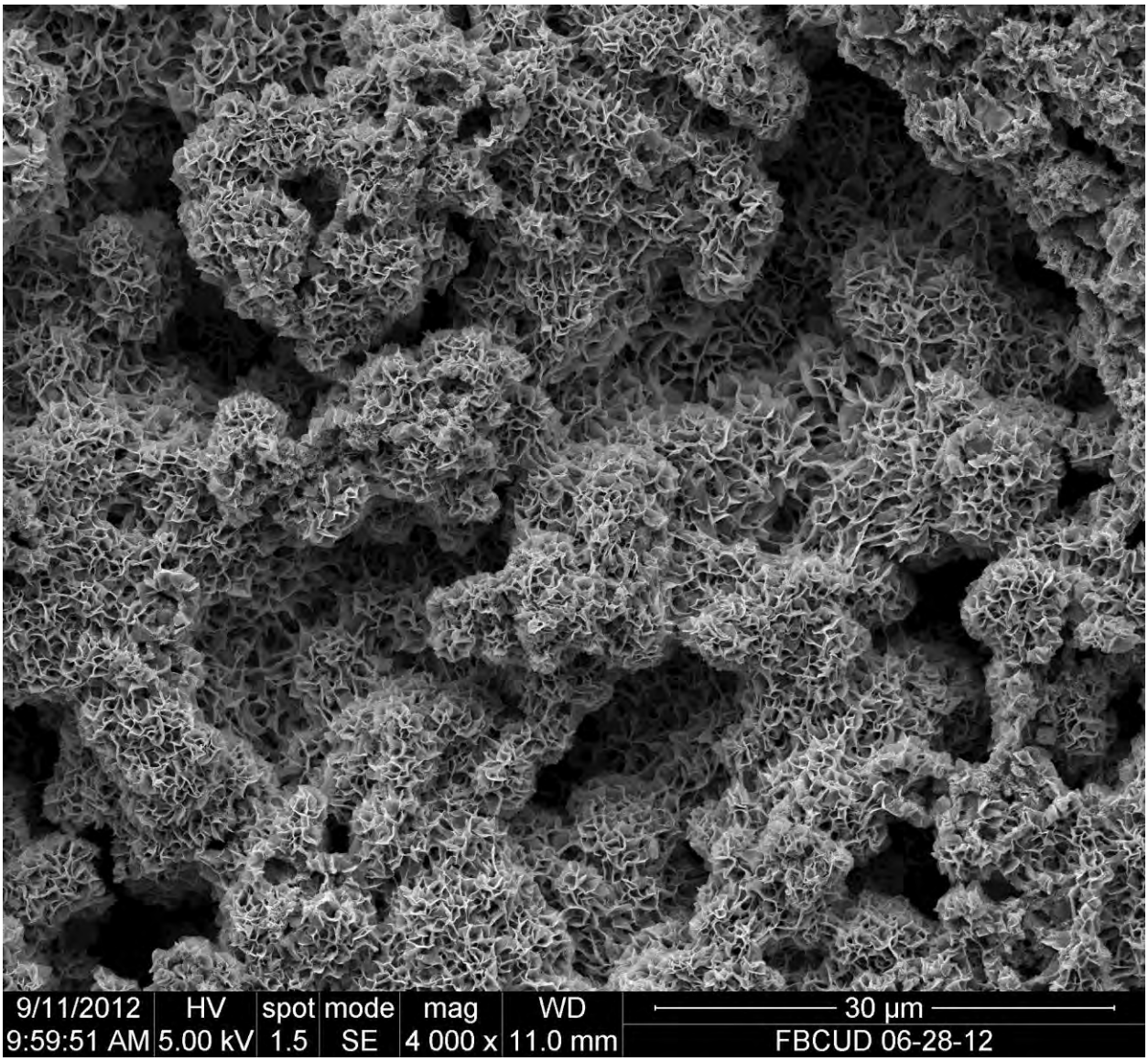
A.6-7: SEM image of smectite corrosion



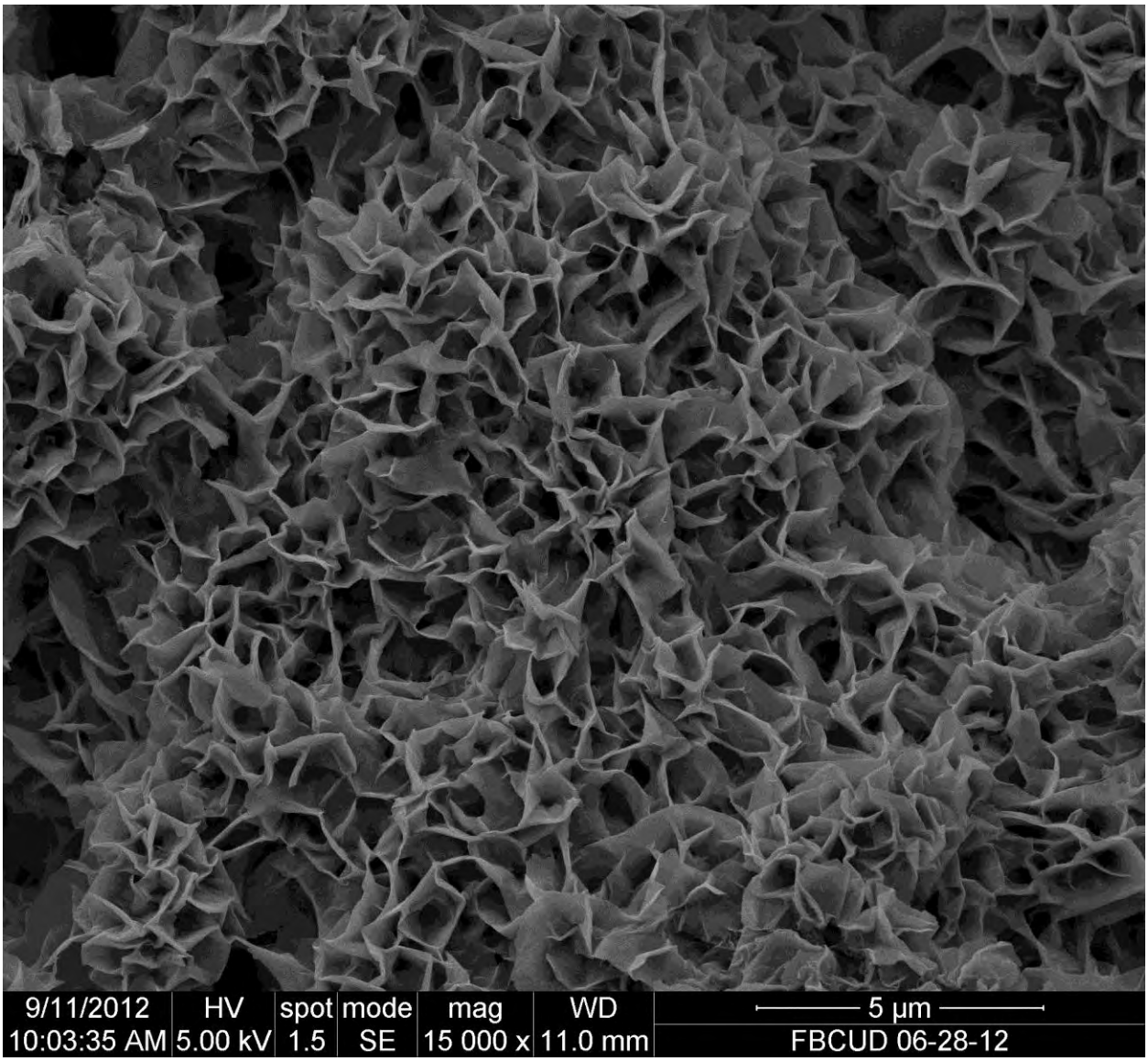
A.6-8: SEM image of matrix smectite over iron saponite



A.6-9: SEM image of matrix smectite over iron saponite

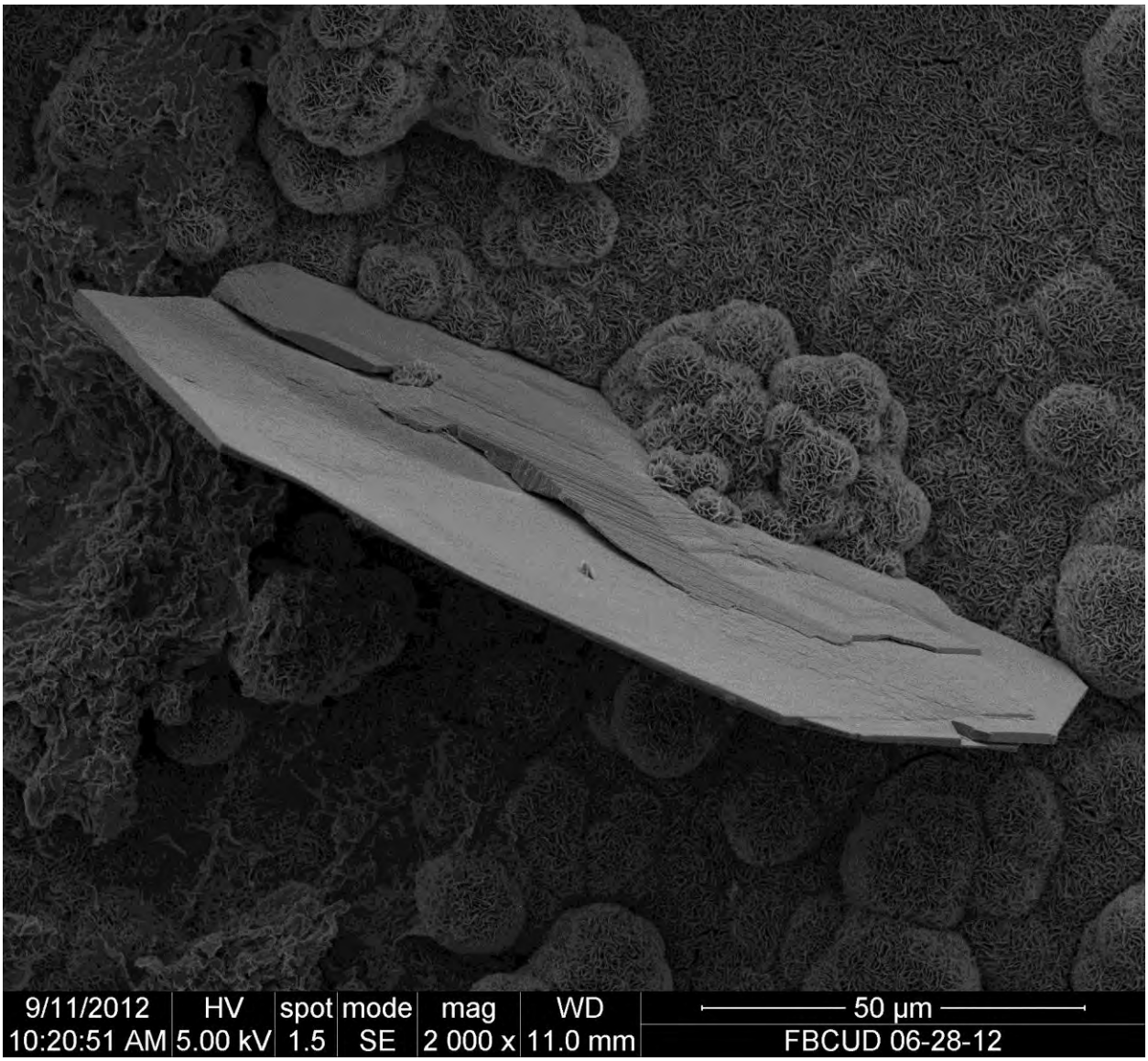


A.6-10: SEM image of iron saponite roses on the low carbon stainless steel corrosion

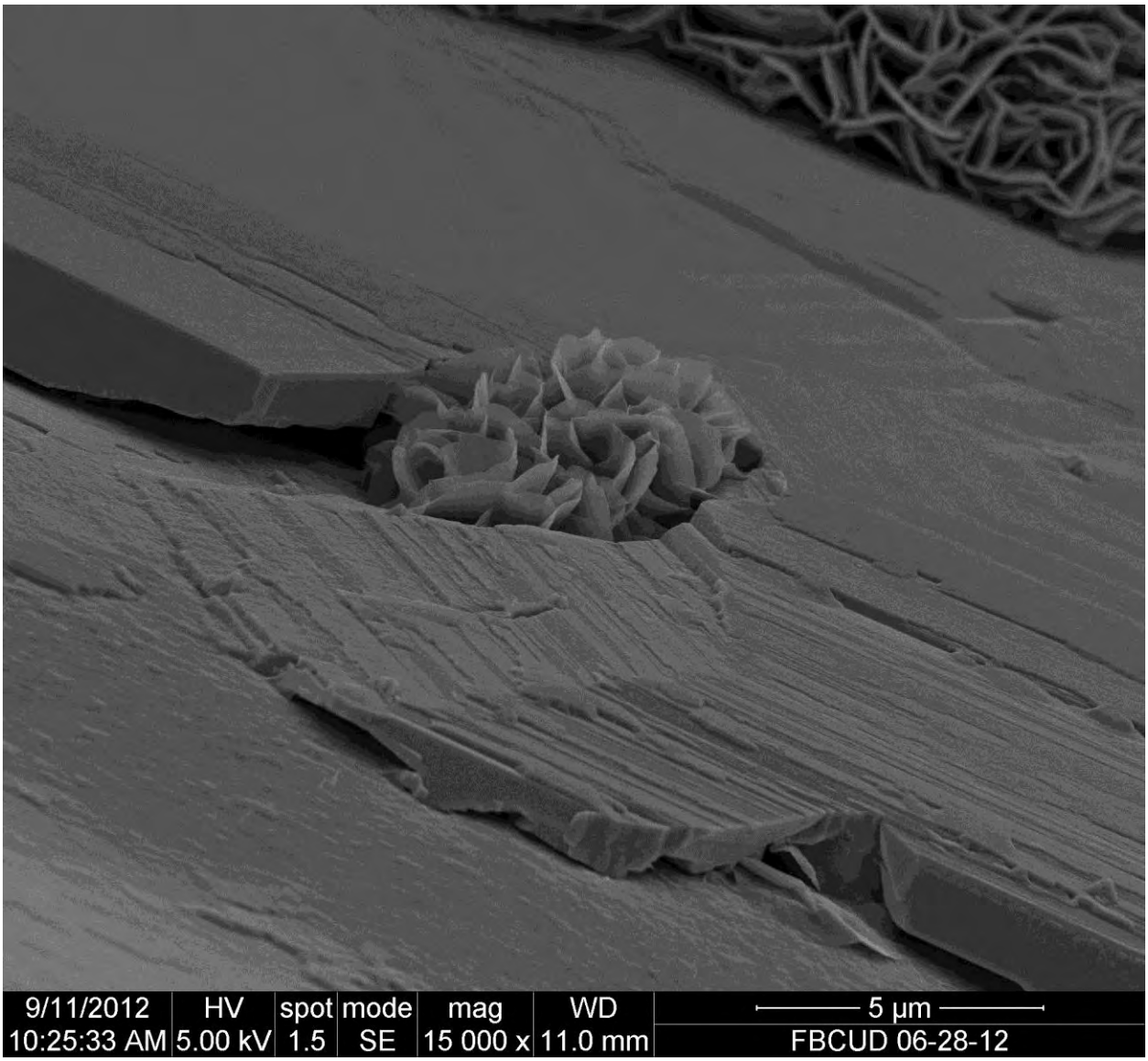


A.6-11: close up SEM image of smectite roses on low carbon stainless steel from EBS 6

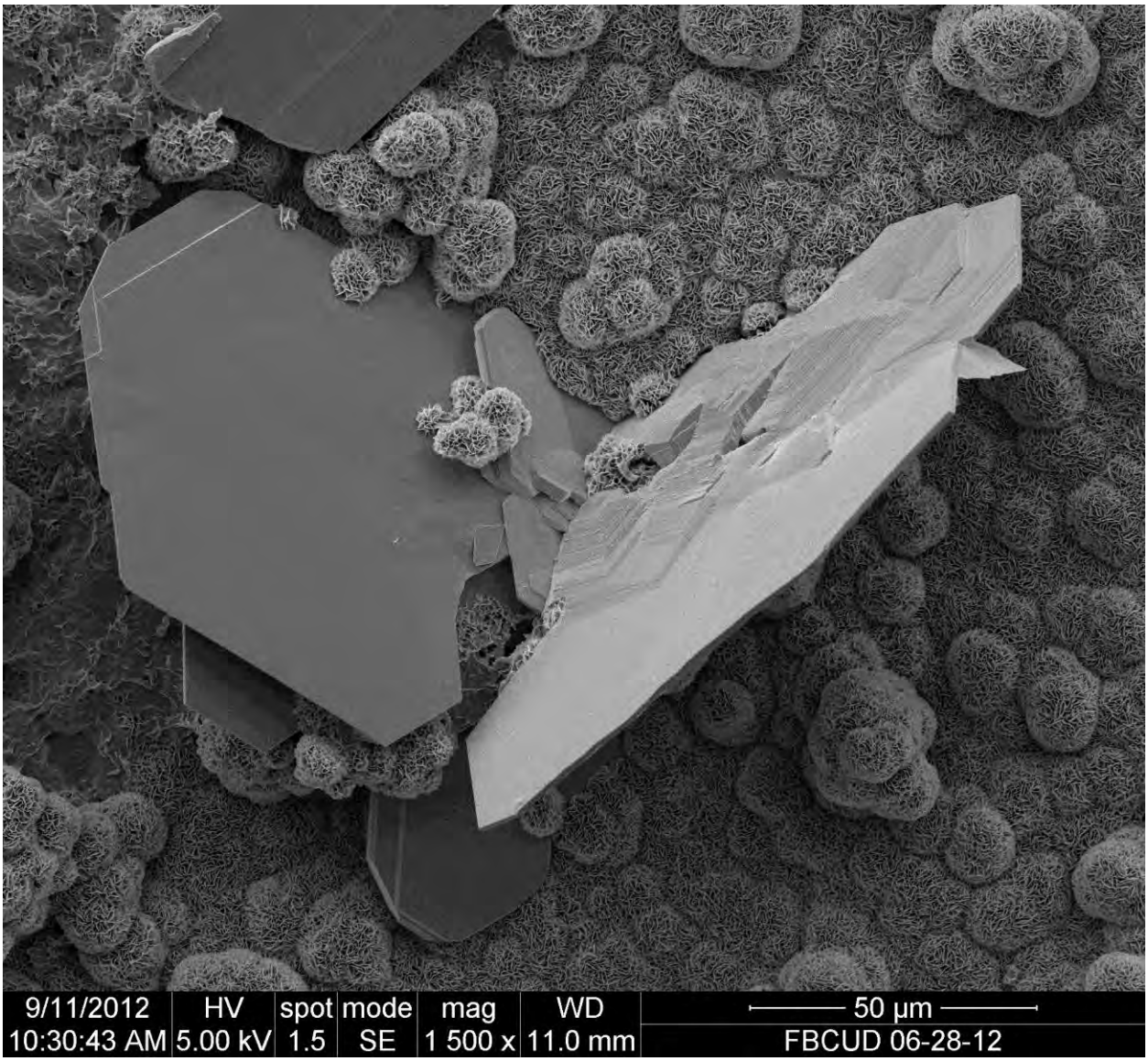
A.6-12: SEM image of iron saponite on low carbon stainless steel from EBS 6



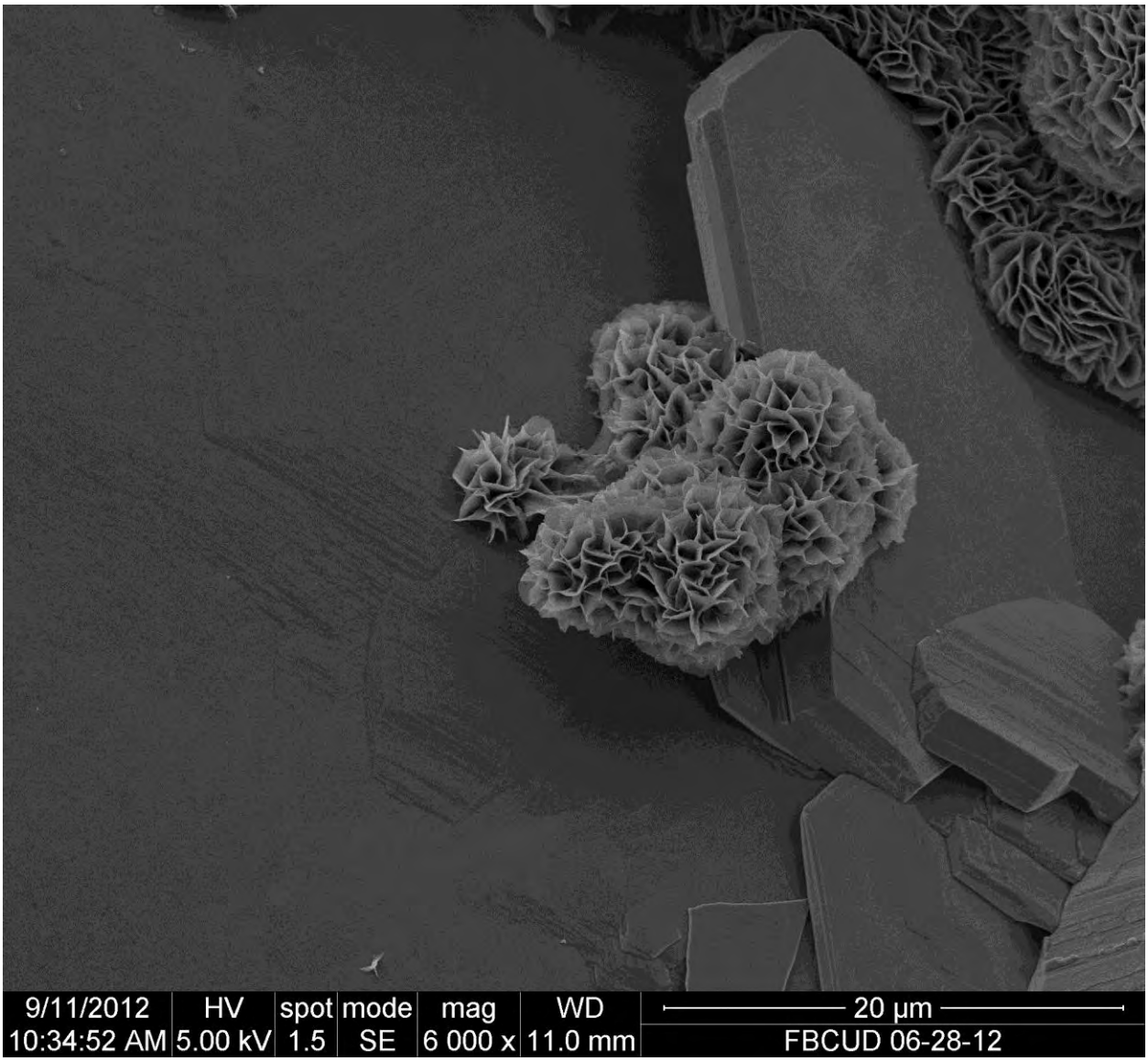
A.6-13: SEM image of pyrrhotite blade embedded in Fe-saponite over low carbon stainless steel



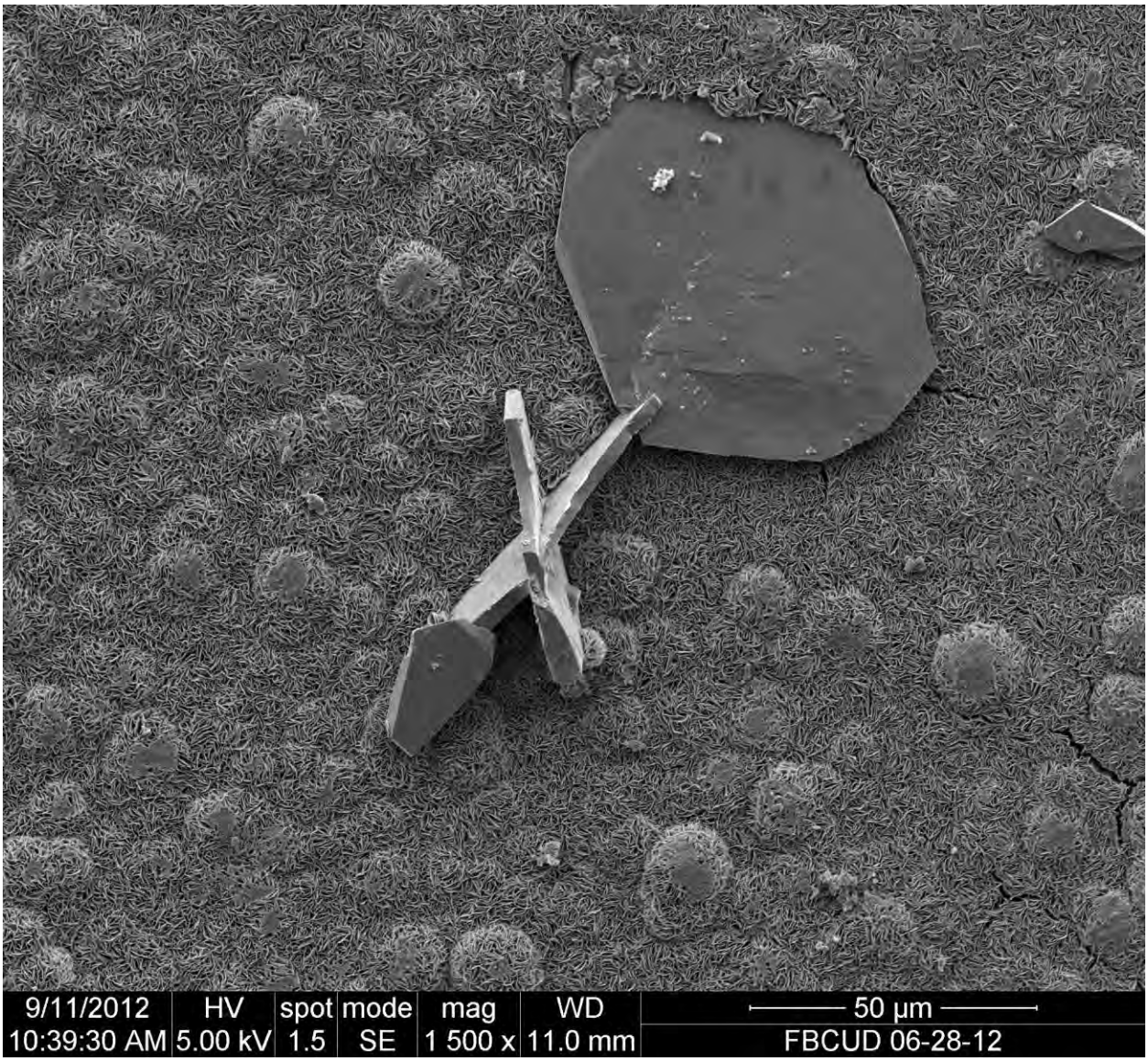
A.6-14: SEM image of iron saponite within pyrrhotite on low carbon stainless steel from EBS 6



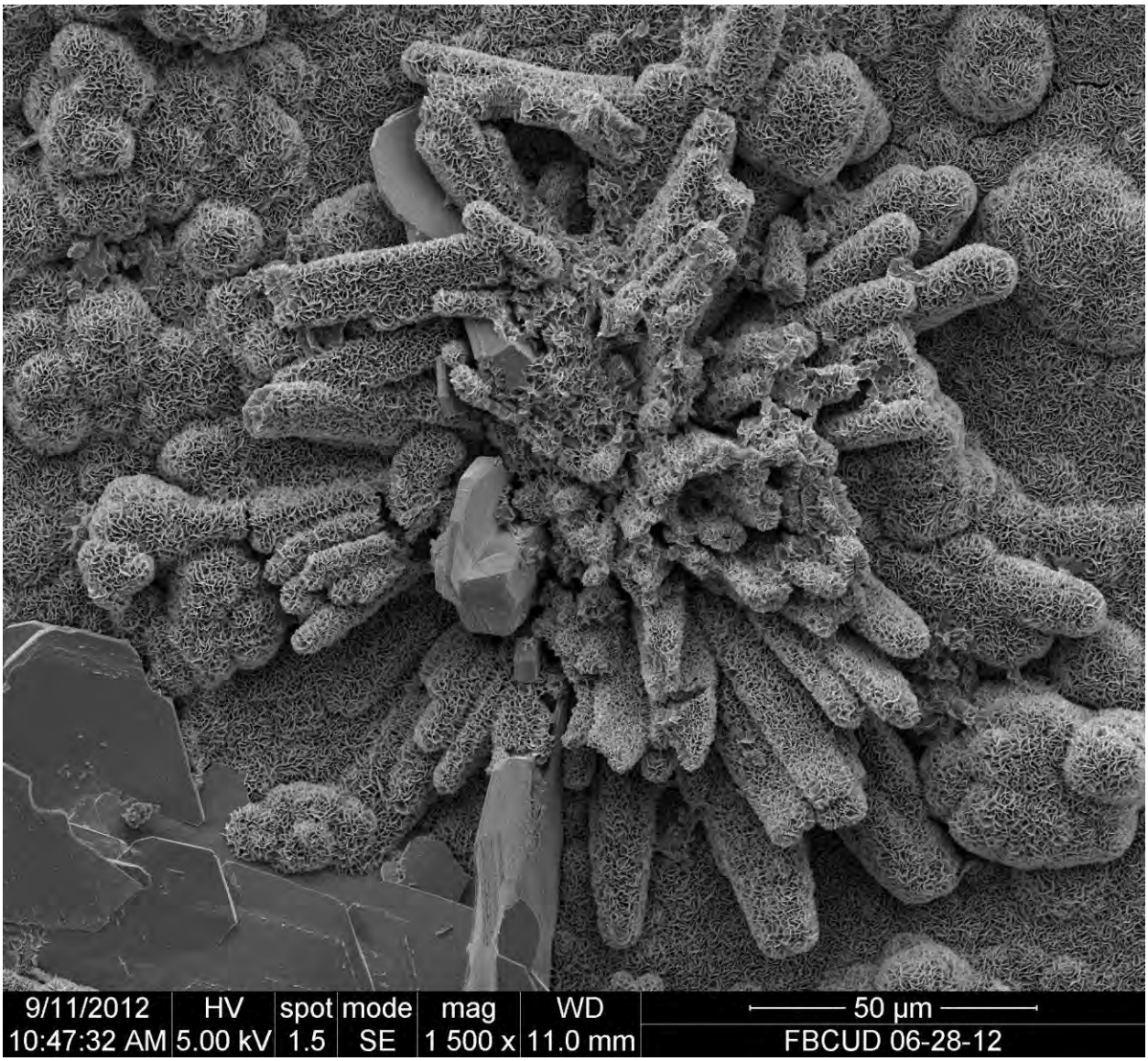
A.6-15: SEM image of pyrrhotite and iron saponite on low carbon stainless steel from EBS 6



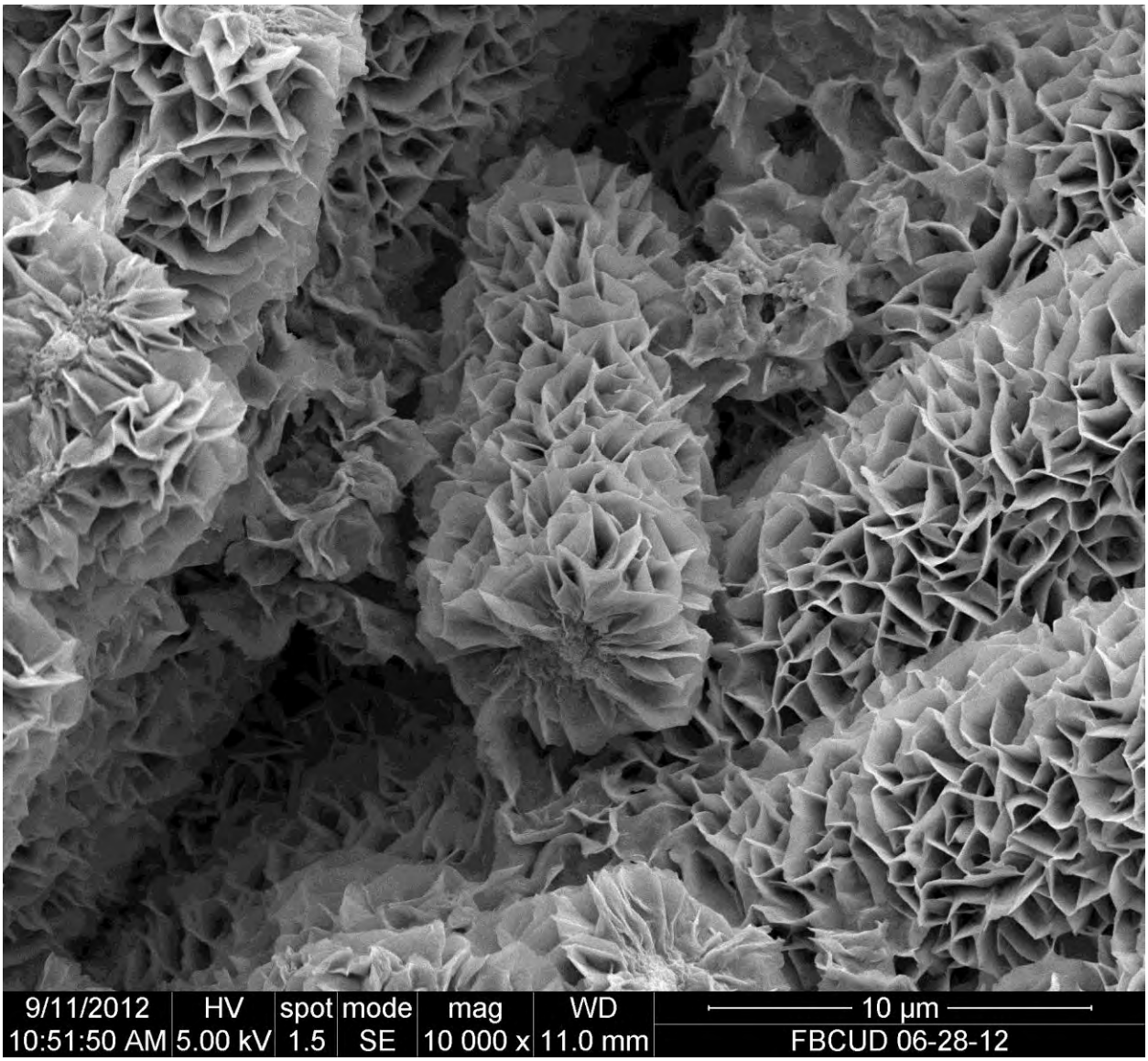
A.6-16: SEM image of saponite on pyrrhotite on low carbon stainless steel from EBS 6



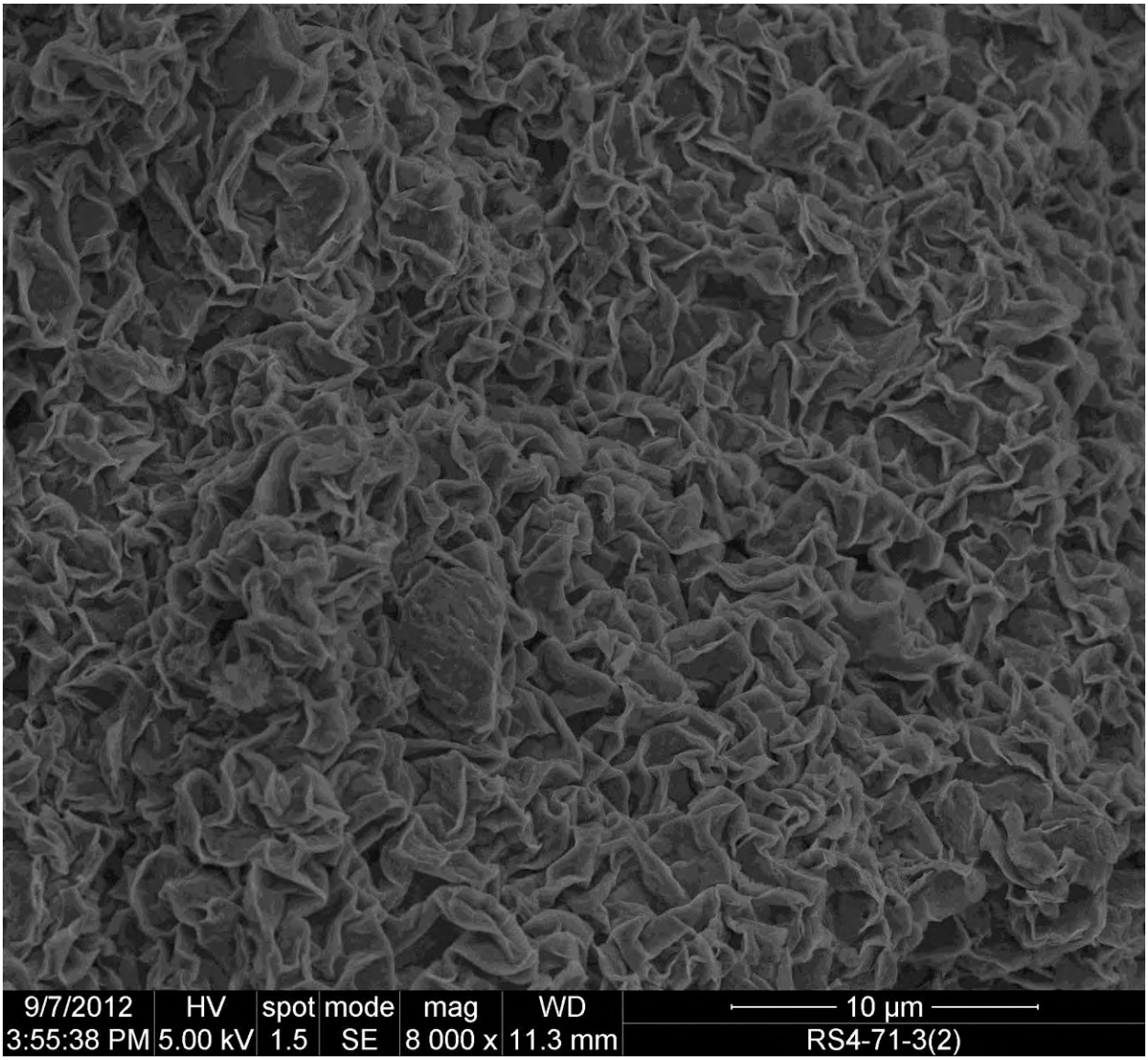
A.6-17: SEM image of pyrrhotite twin on saponite on low carbon stainless steel from EBS 6



A.6-18: SEM image of iron saponite pseudomorphs on low carbon stainless steel from EBS 6



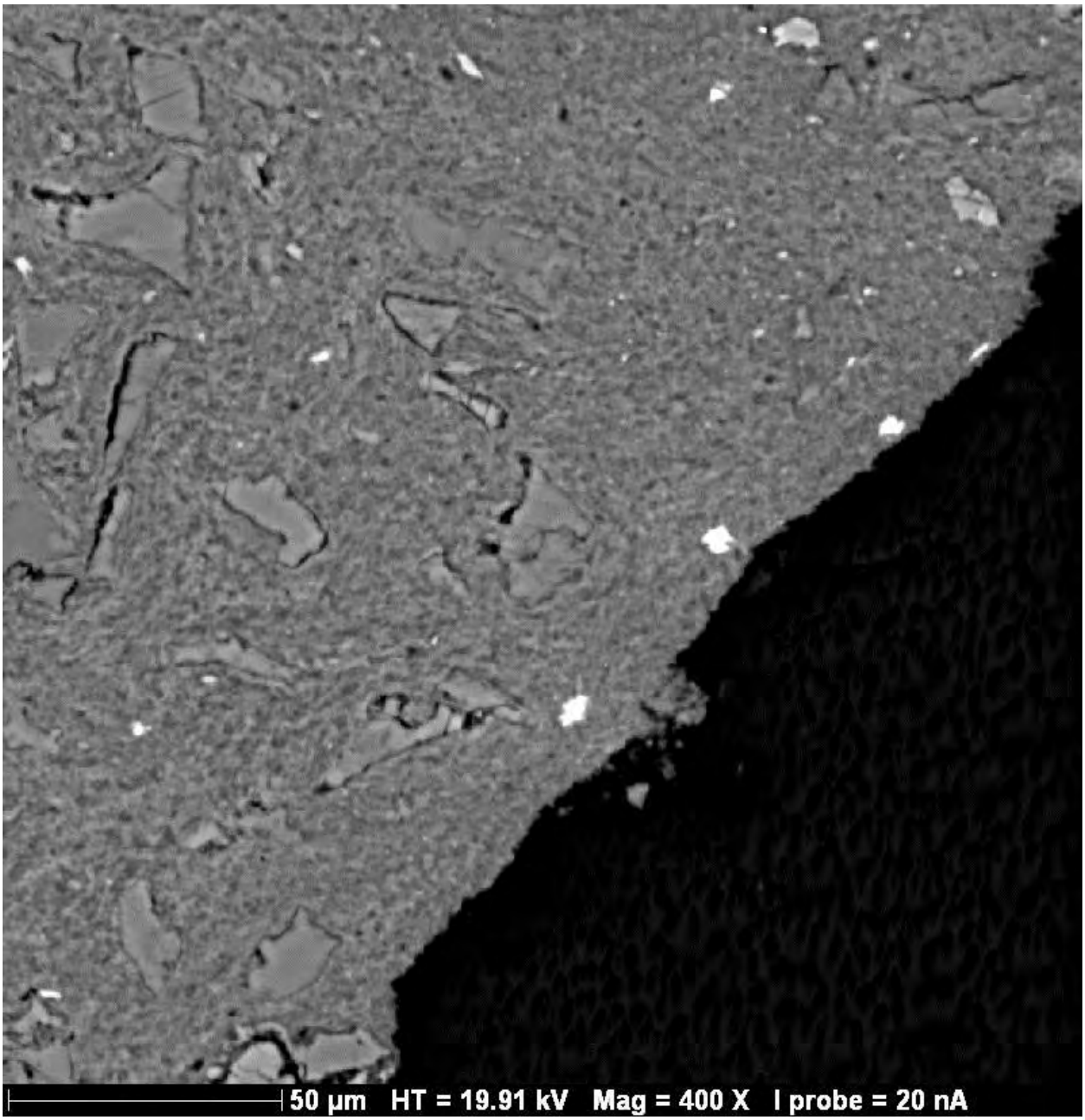
A.6-19: SEM image of iron saponite pseudomorphs on low carbon stainless steel



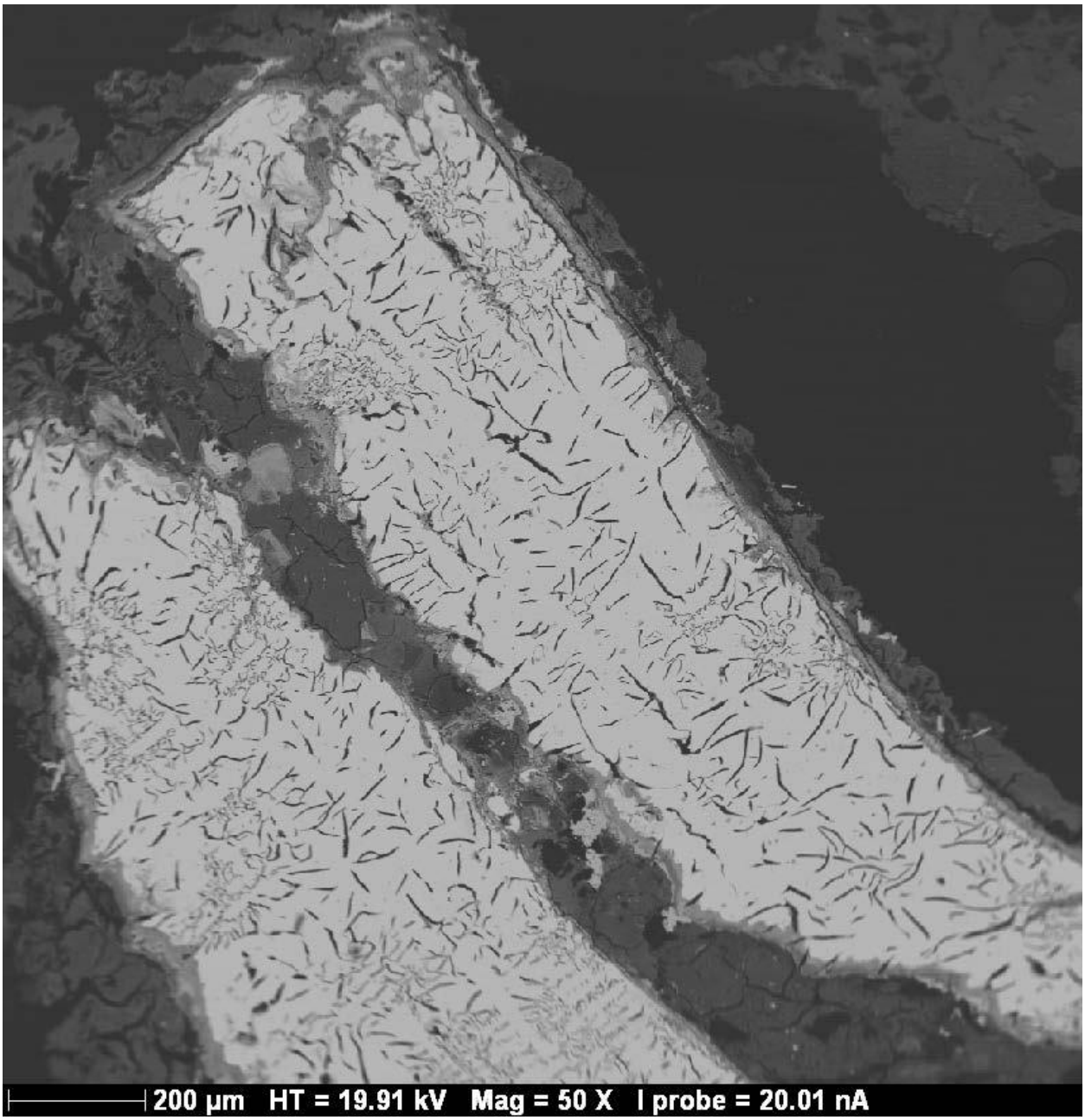
A.6-20: SEM image of smectite from EBS 6

Appendix A.7

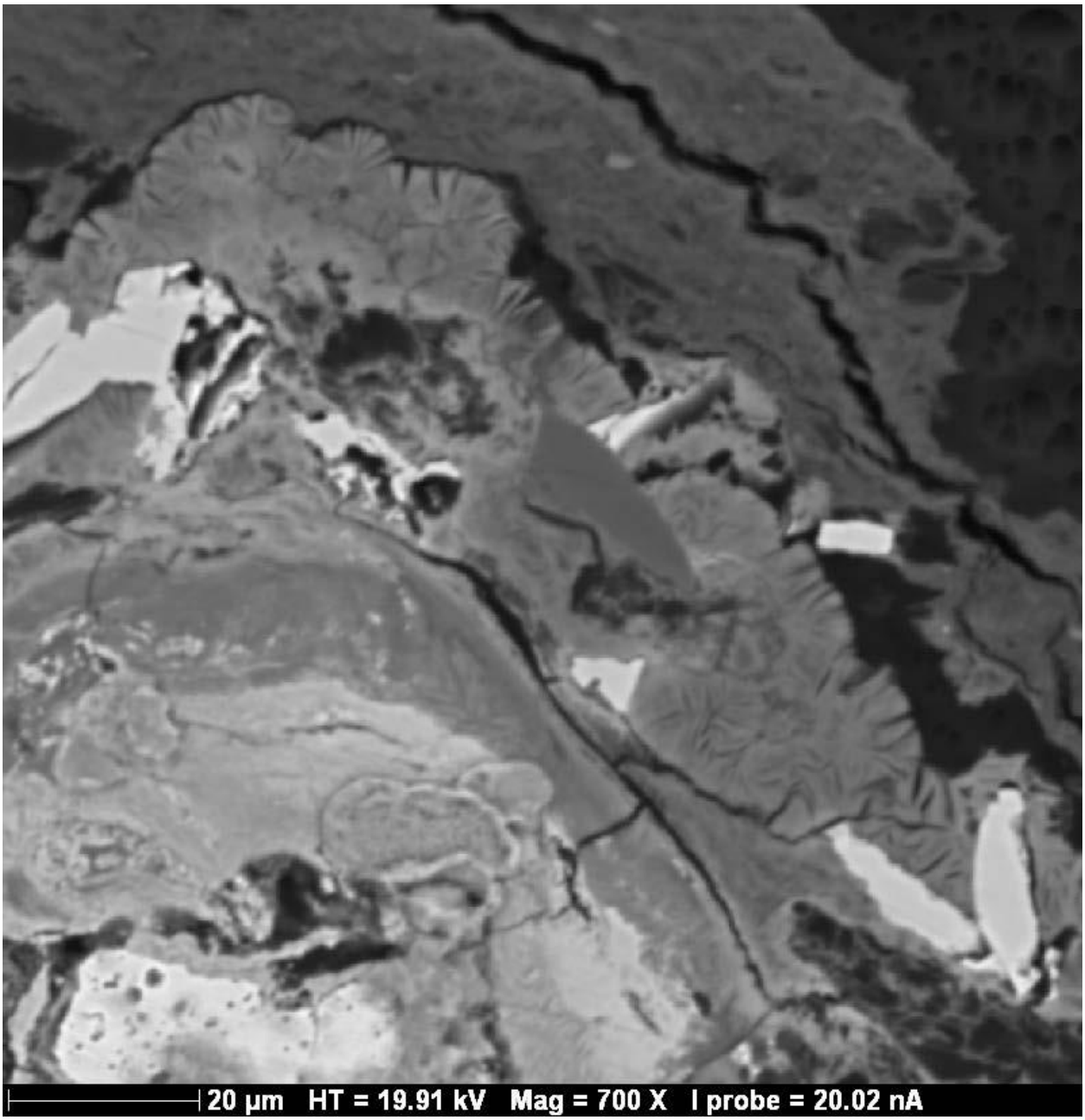
EBS-7 Step temperature increase (100, 200, 300 ^{o}C) at 150 bar for 5 weeks run with Graphite



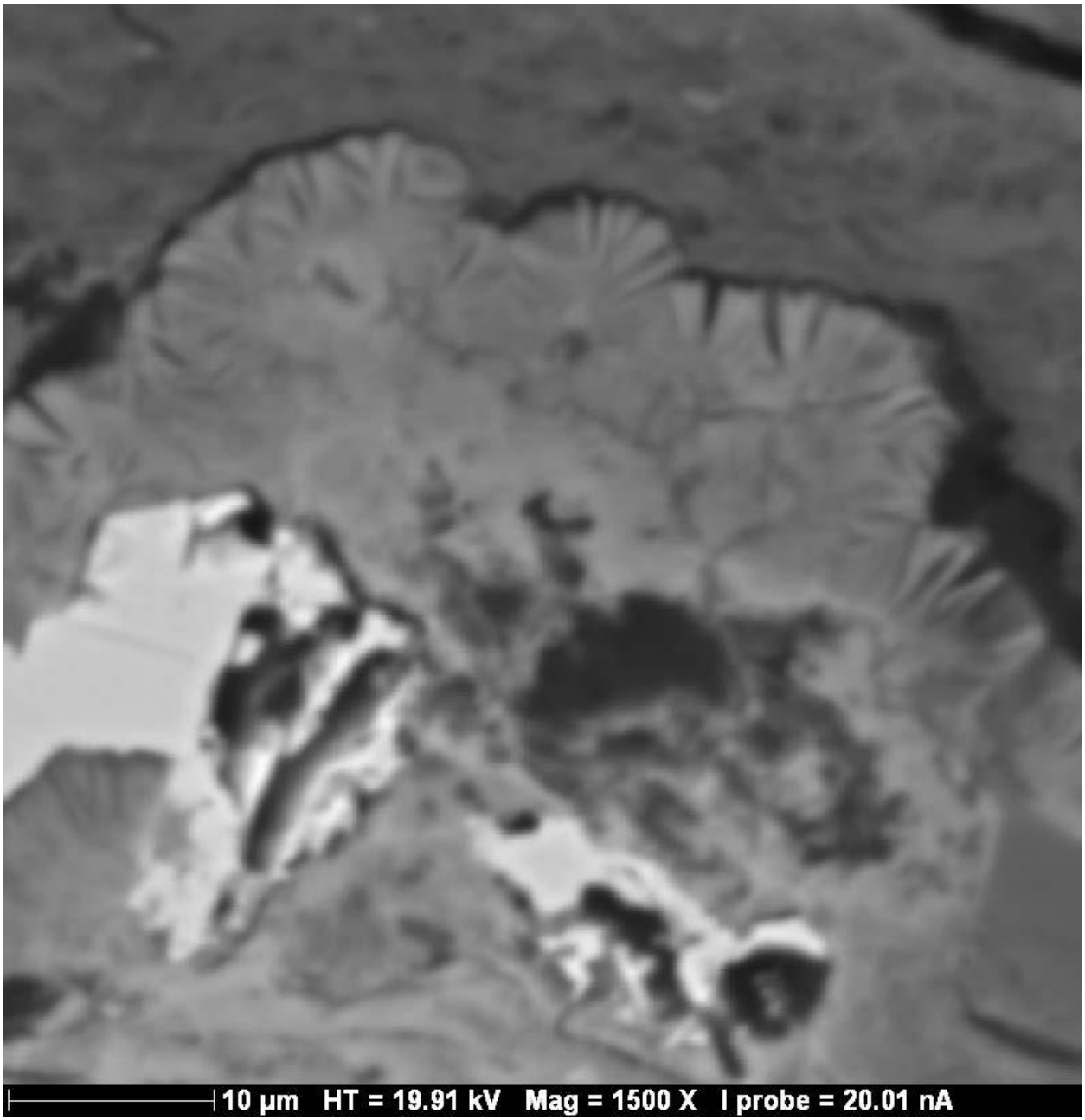
A.7-1: Back Scattered Electron image of EBS 7 thin section



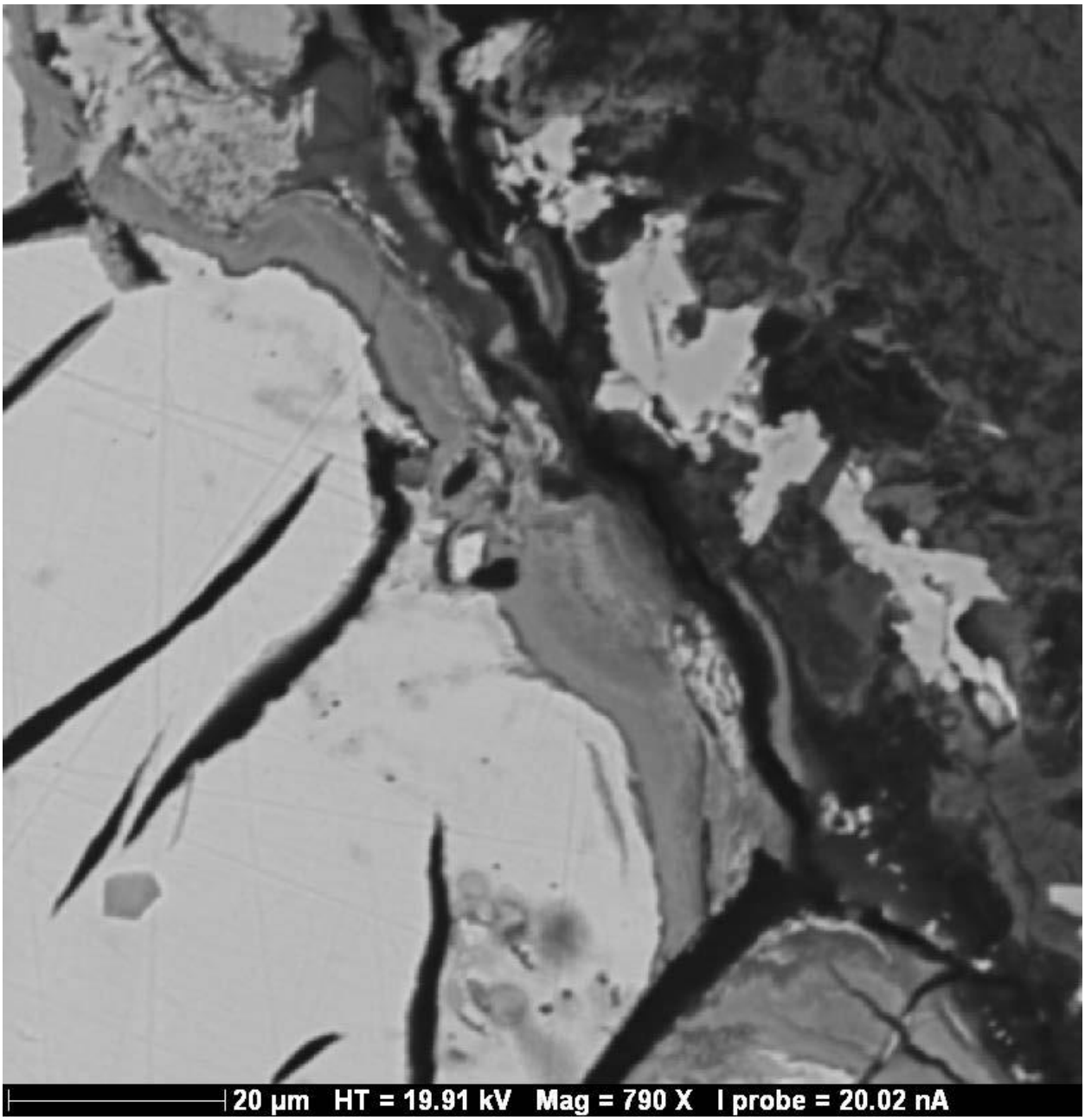
A.7-2: Back Scattered Electron image of EBS 7 thin section



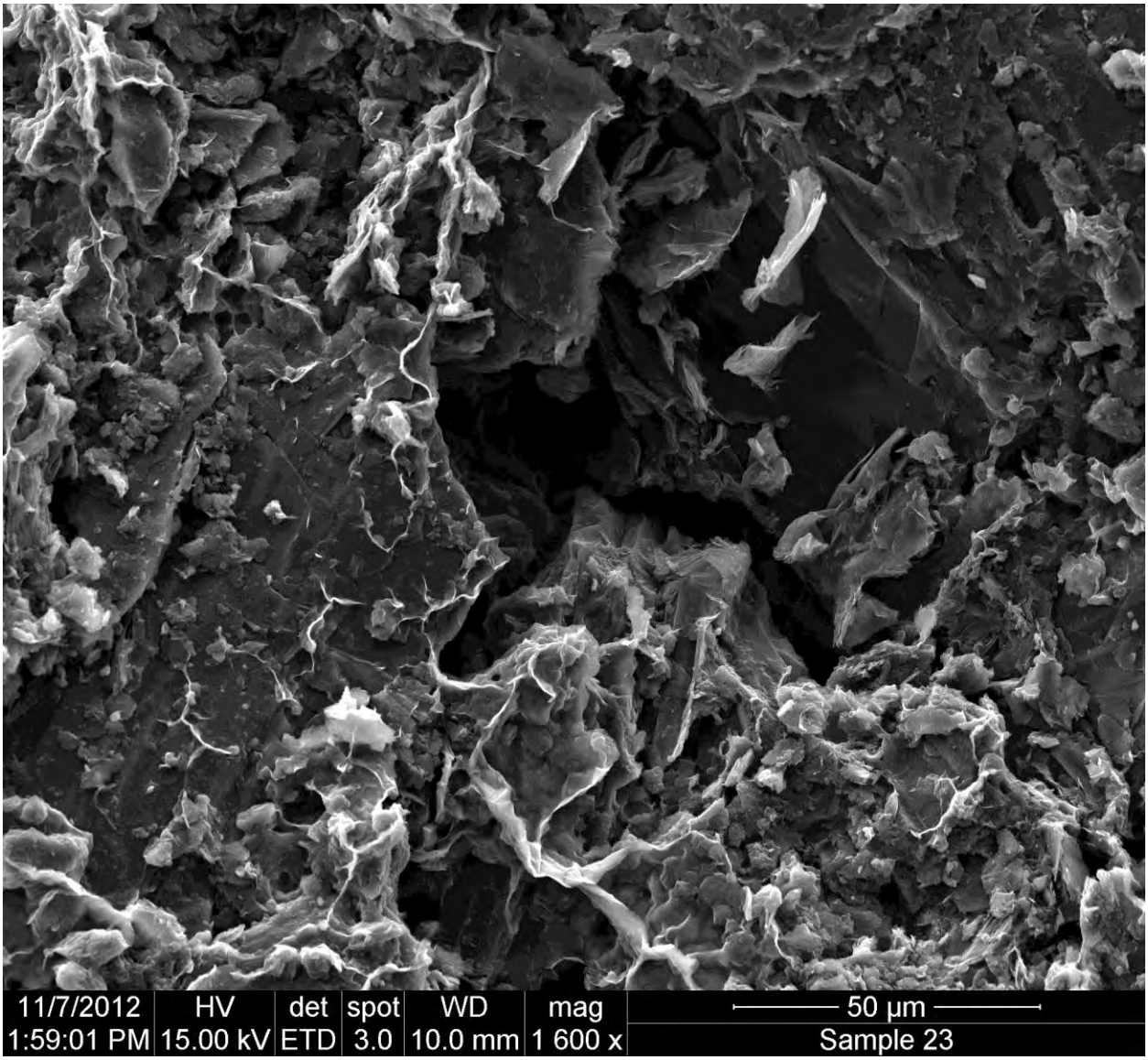
A.7-3: Back Scattered Electron image fibrous Fe-saponite surrounding Fe metal



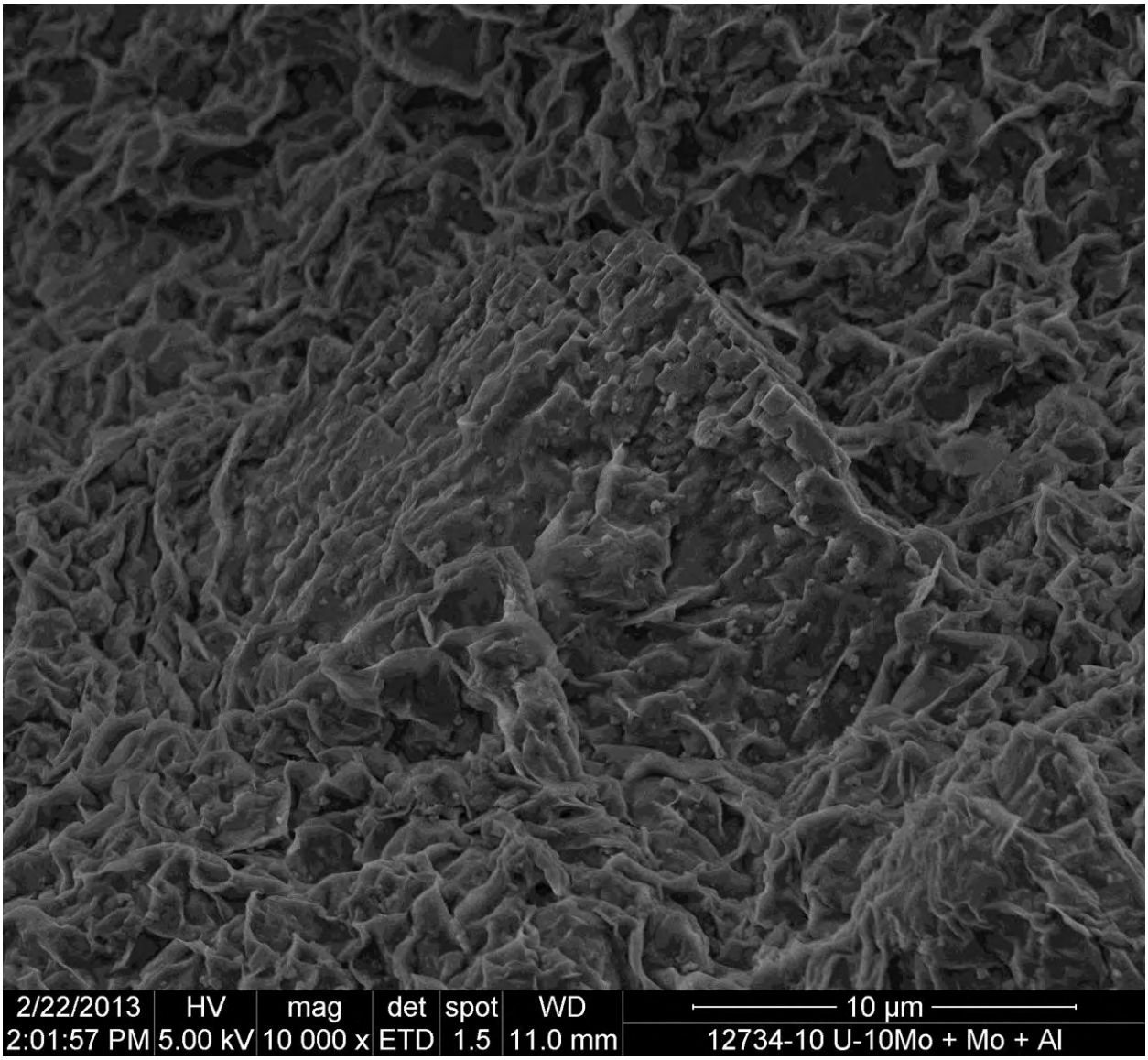
A.7-4: Back Scattered Electron image fibrous Fe-saponite surrounding Fe metal



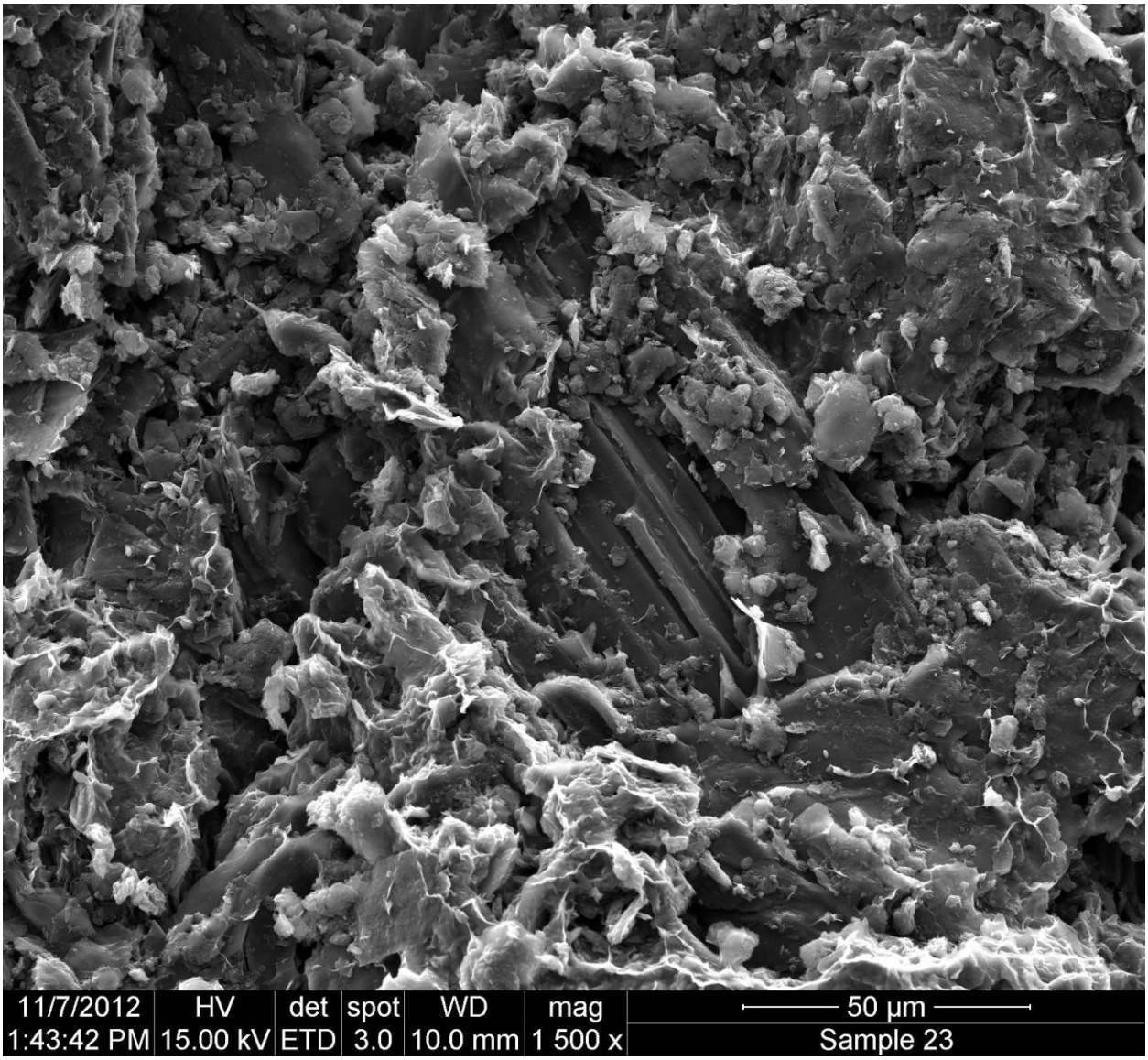
A.7-5: Back Scattered Electron image fibrous Fe-saponite surrounding Fe metal



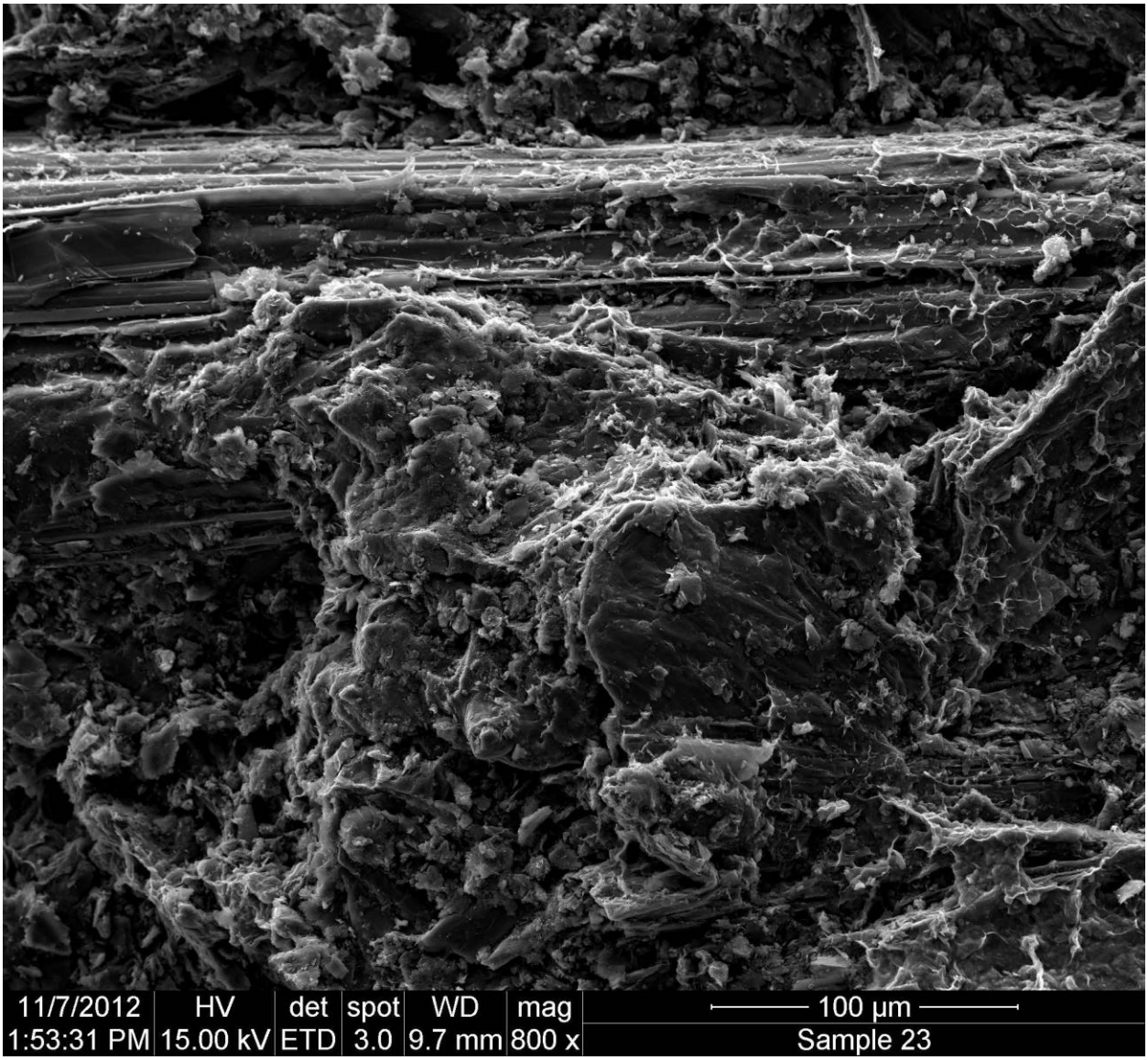
A.7-6: SEM image of bentonite matrix from EBS 7



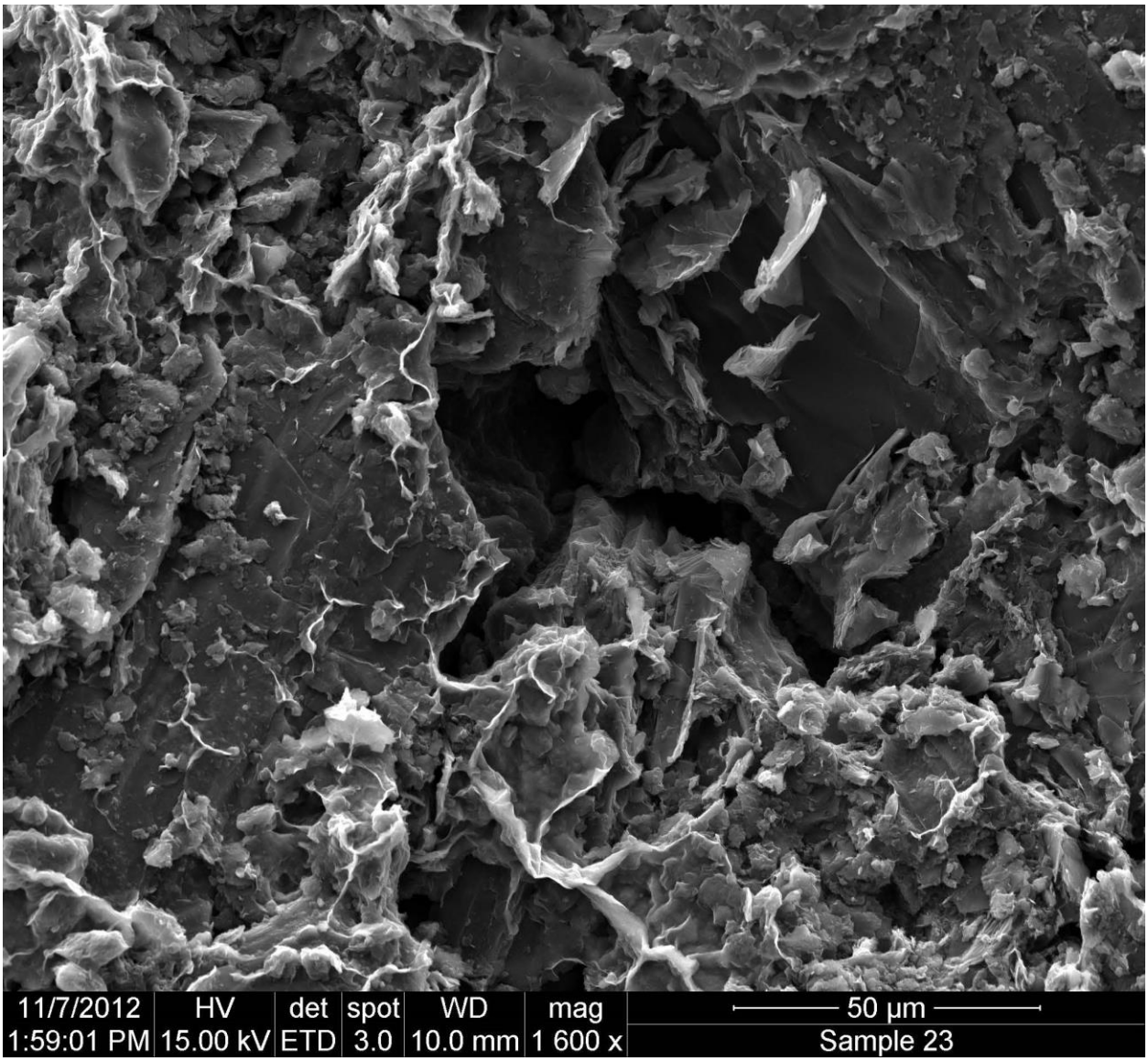
A.7-7: SEM image of corroded phenocryst within bentonite bulk matrix



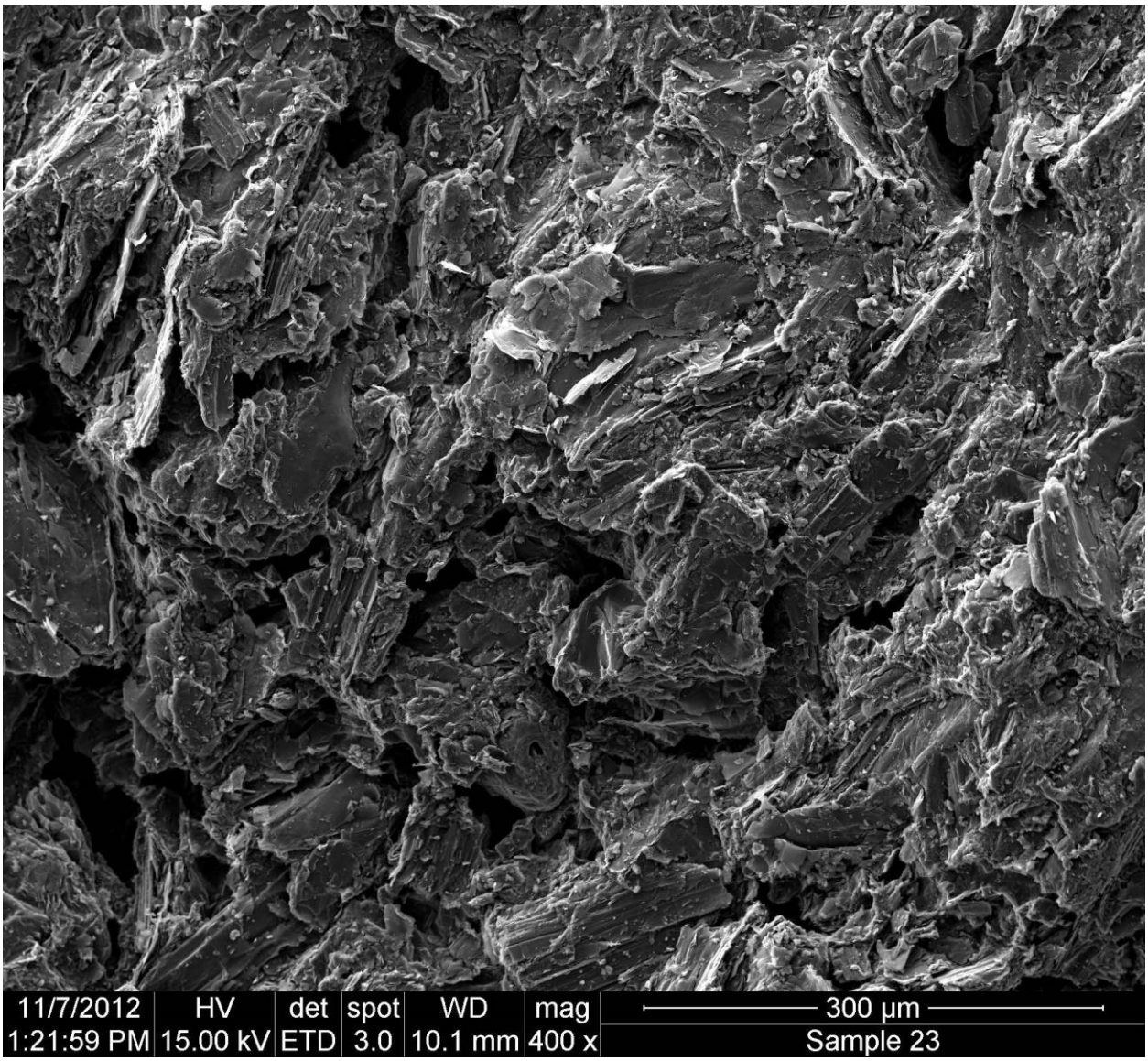
A.7-8: SEM image of graphite and bentonite matrix from EBS 7



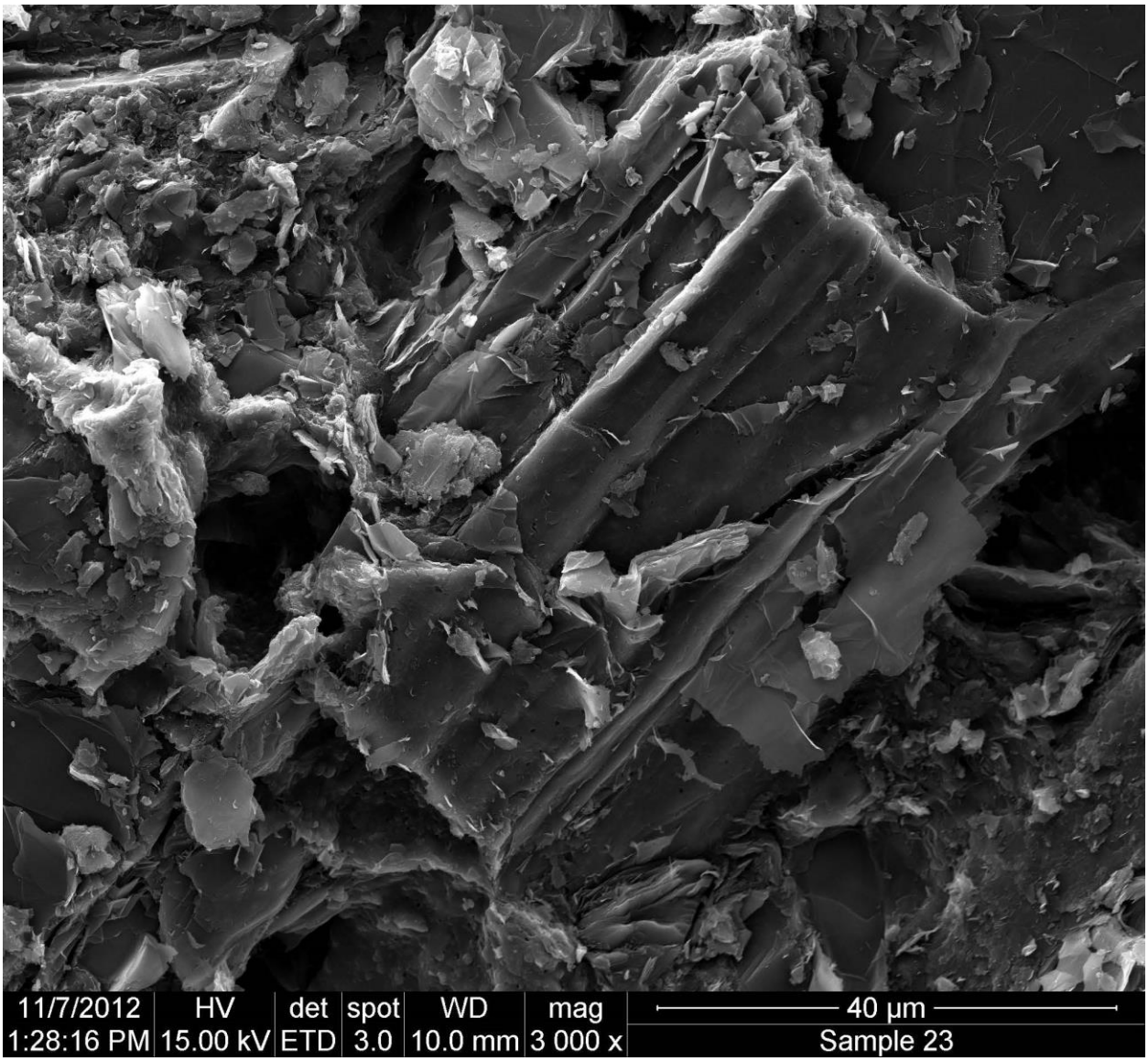
A.7-9: SEM image of graphite and bentonite matrix from EBS 7



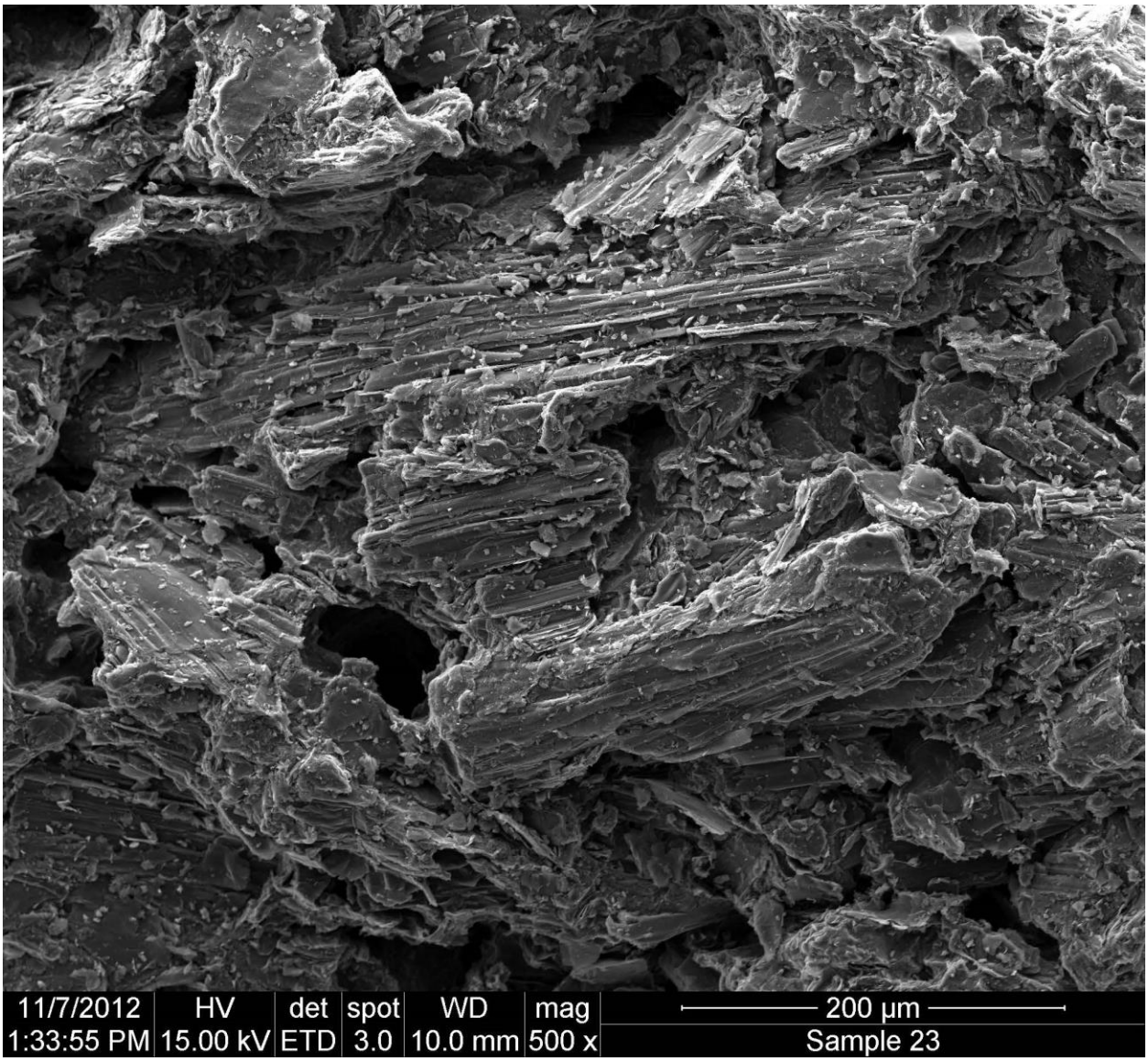
A.7-10: SEM image of graphite and bentonite to smectite from EBS 7



A.7-11: SEM image of graphite



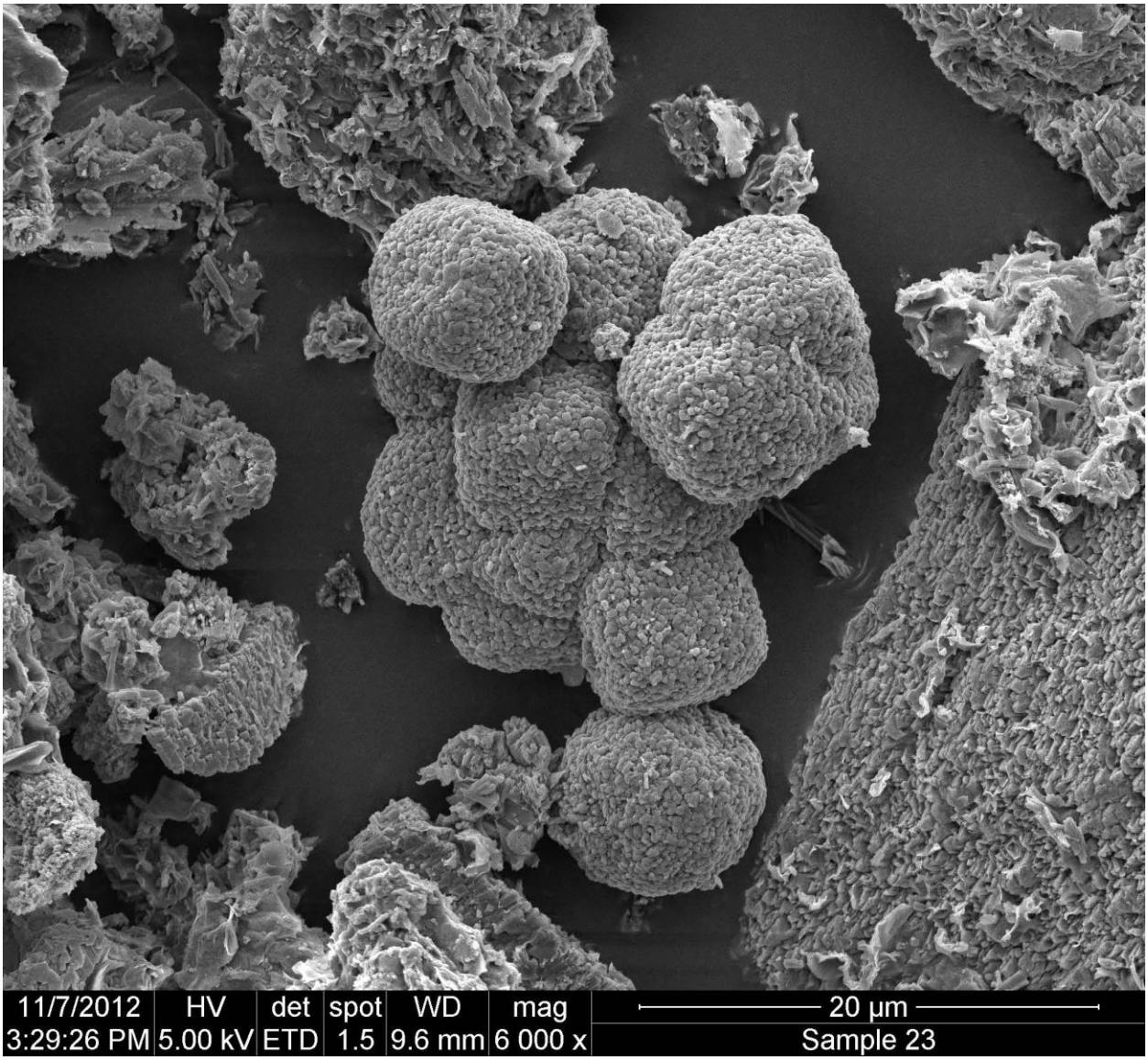
A.7-12: SEM image of graphite with smectite



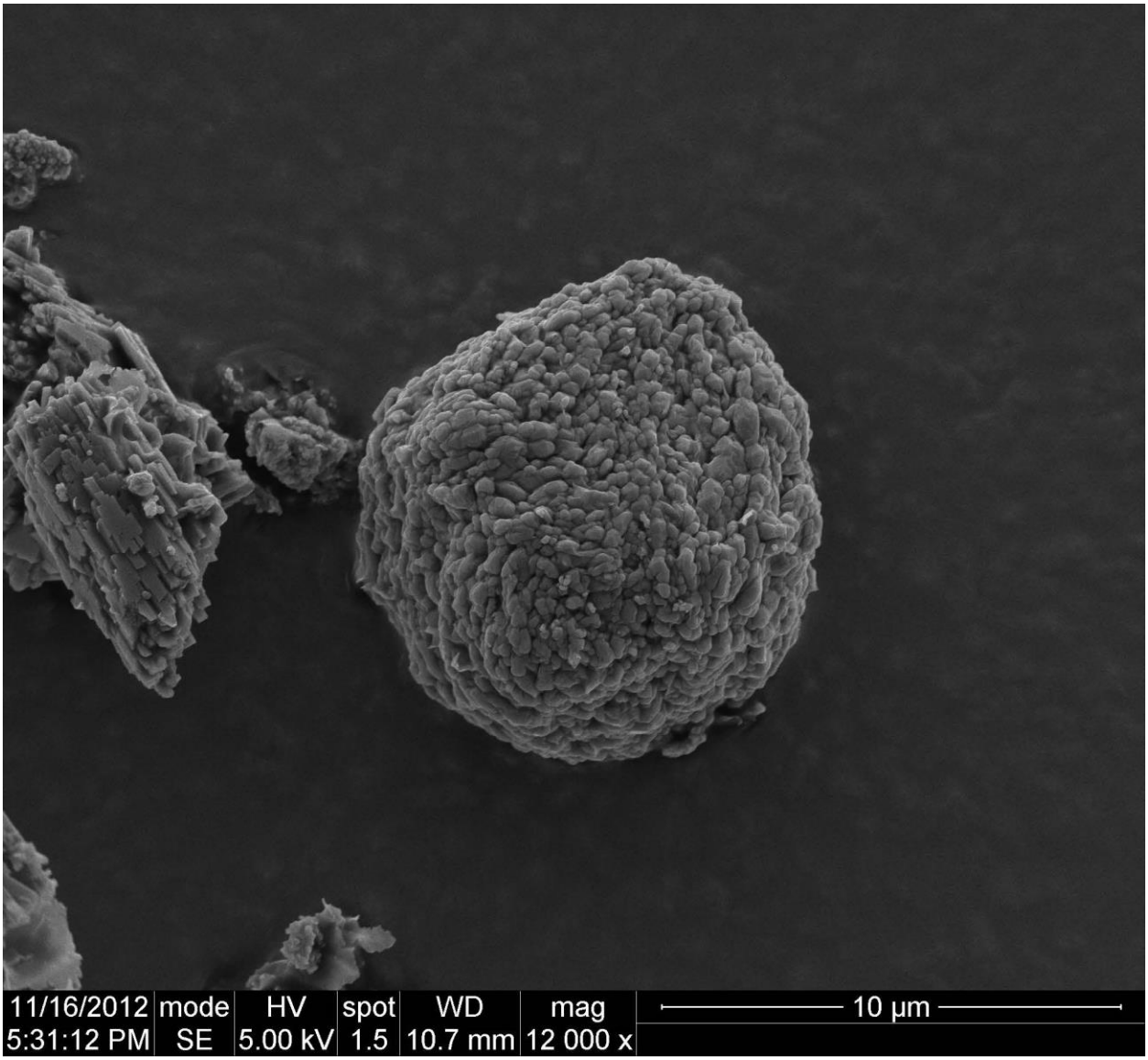
A.7-13: SEM image of graphite from EBS 7

Appendix A.8

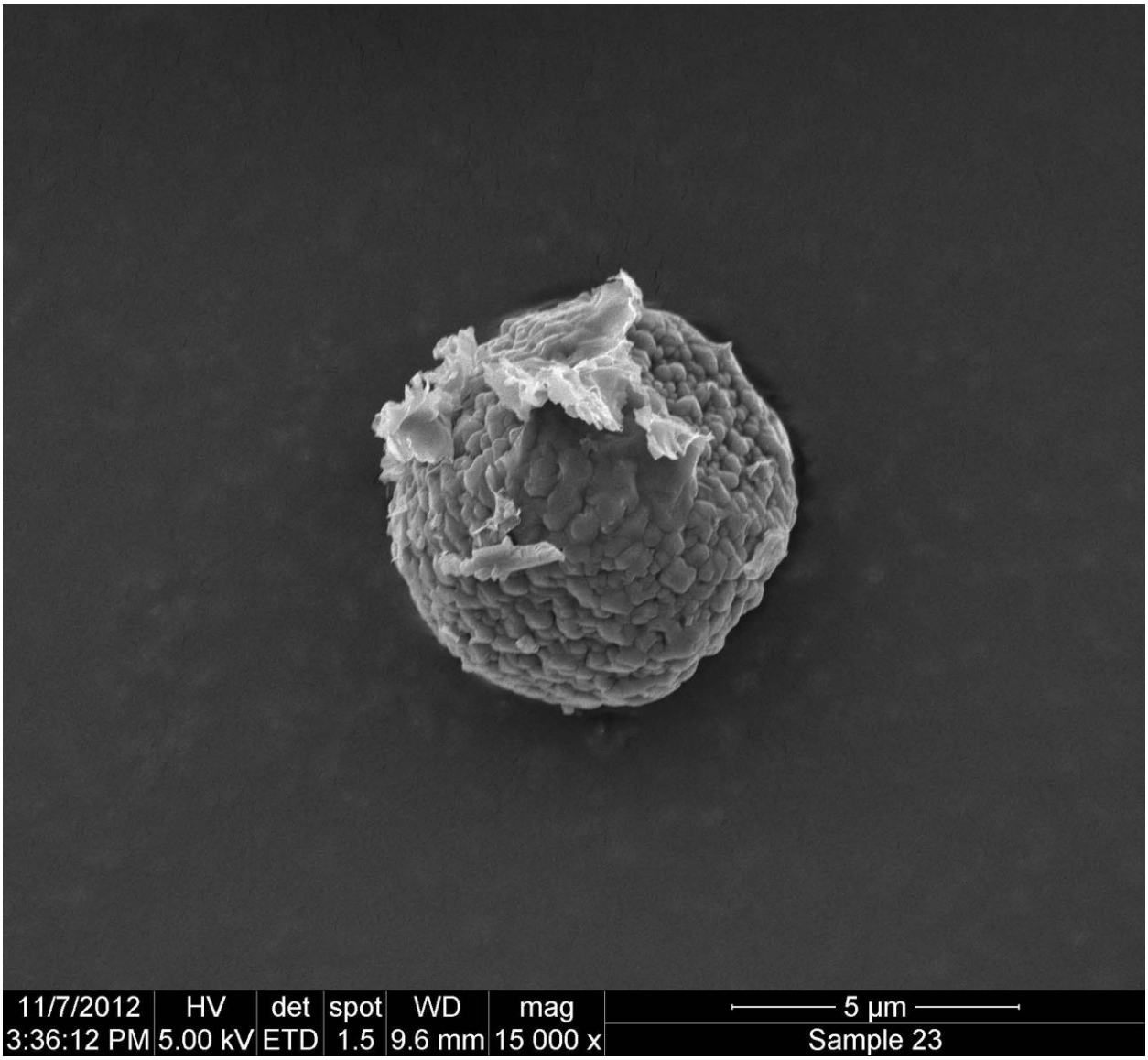
EBS-8 Experiment at 300°C isothermal and 150 bar for six weeks with Copper



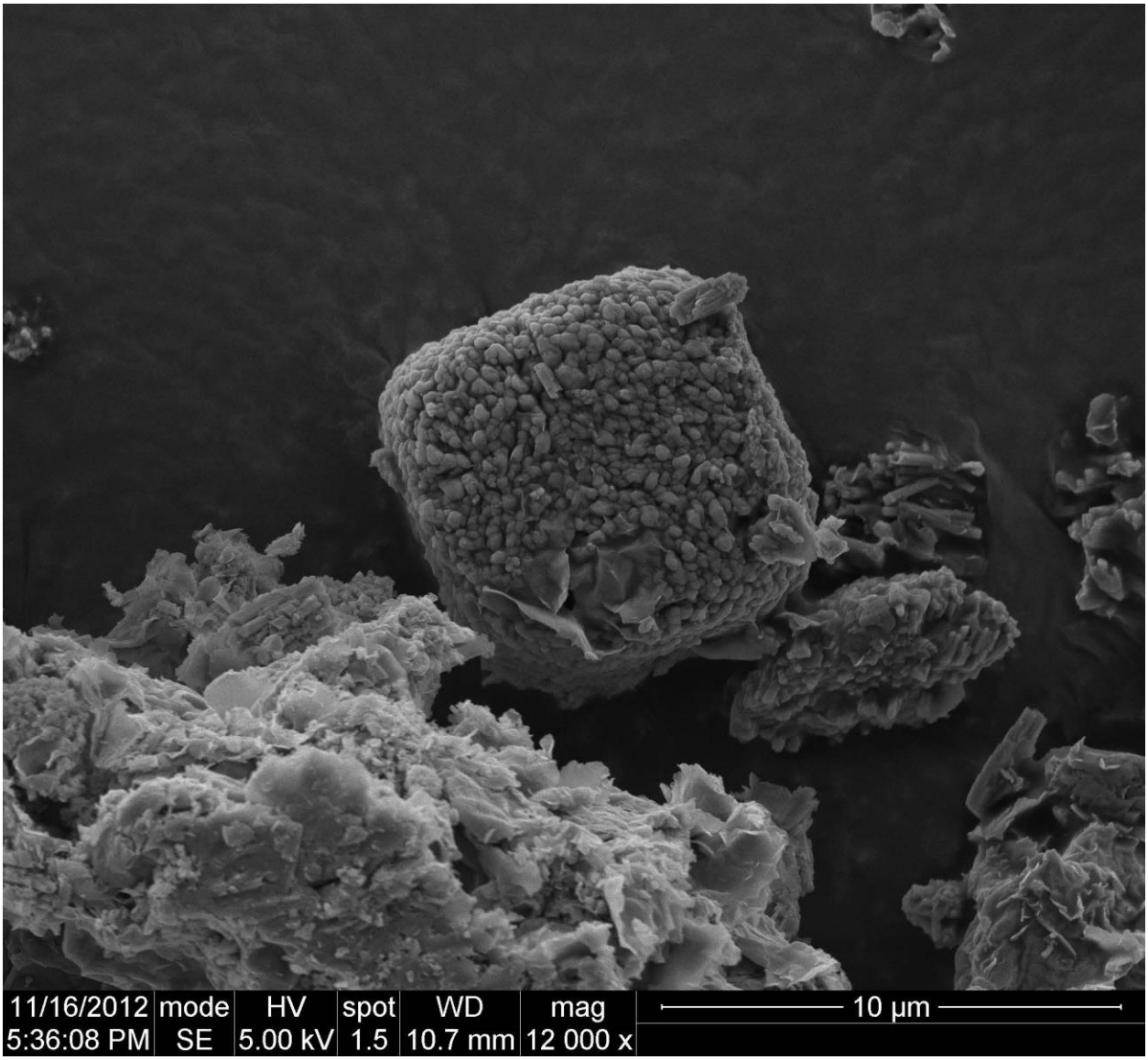
A.8-1: SEM image of analcime cluster from EBS 8



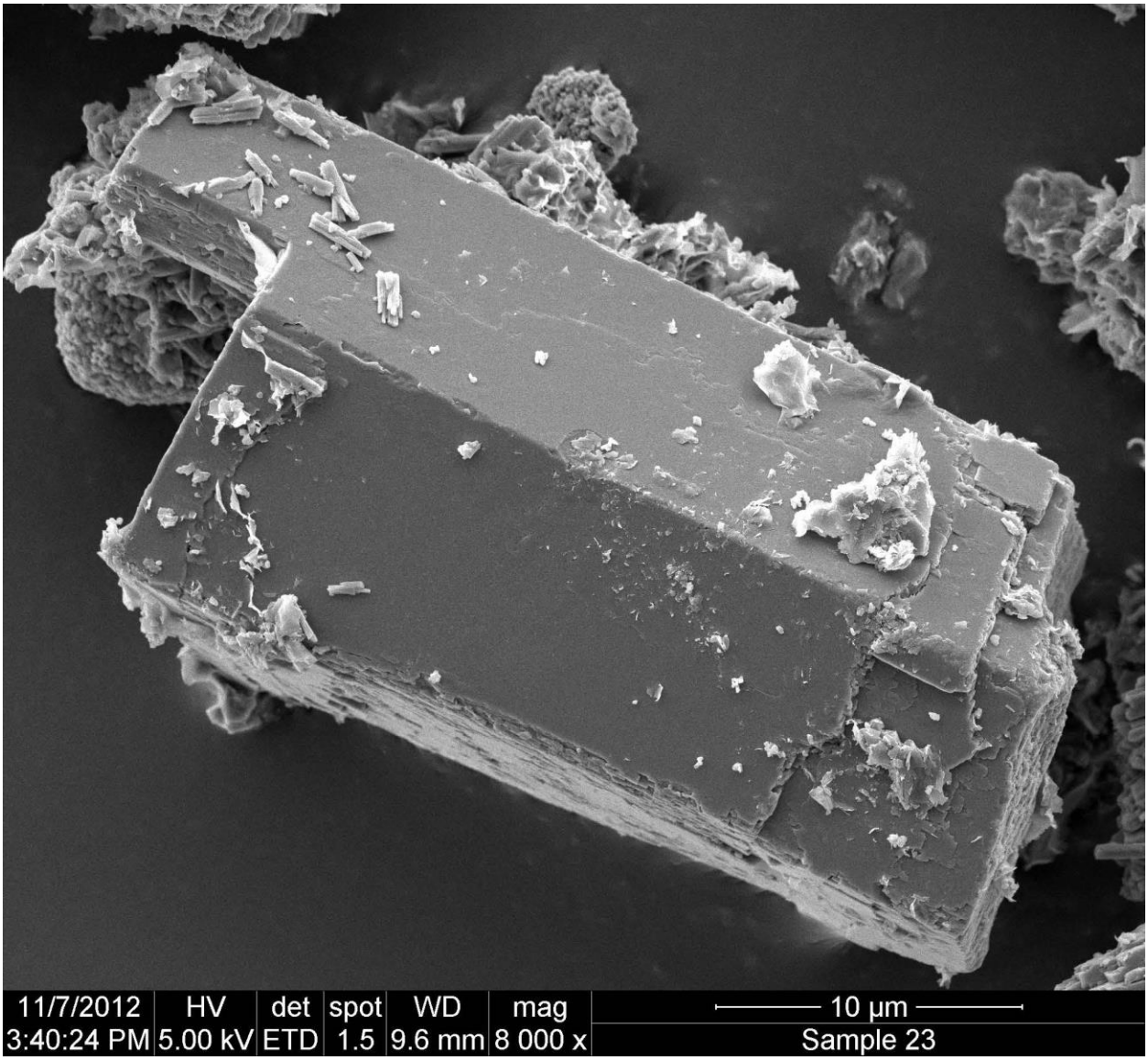
A.8-2: SEM image of crude analcime from EBS 8



A.8-3: SEM image of analcime from EBS 8

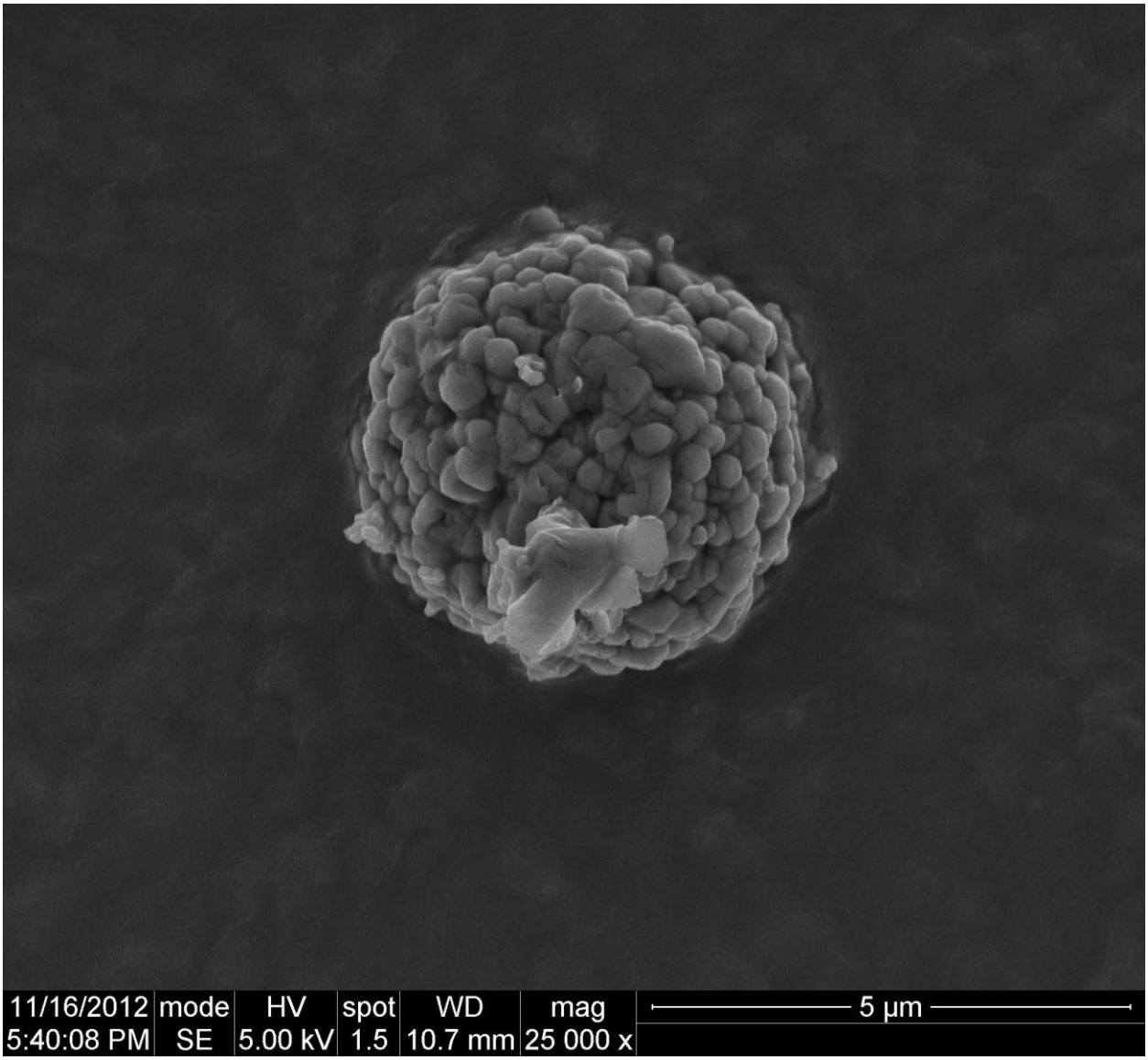


A.8-4: SEM image of analcime from EBS 8

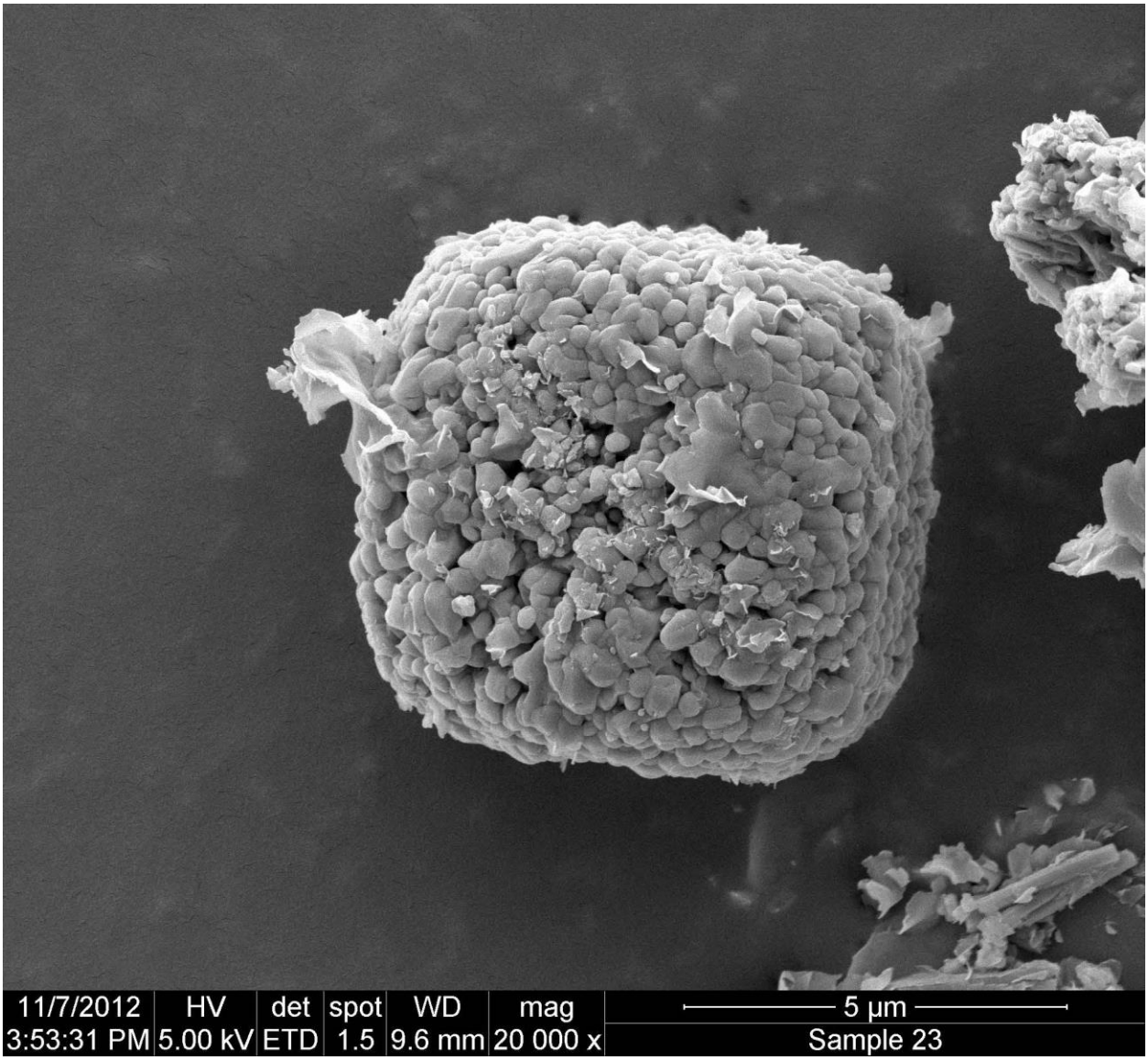


A.8-5: SEM image of sandine from EBS 8

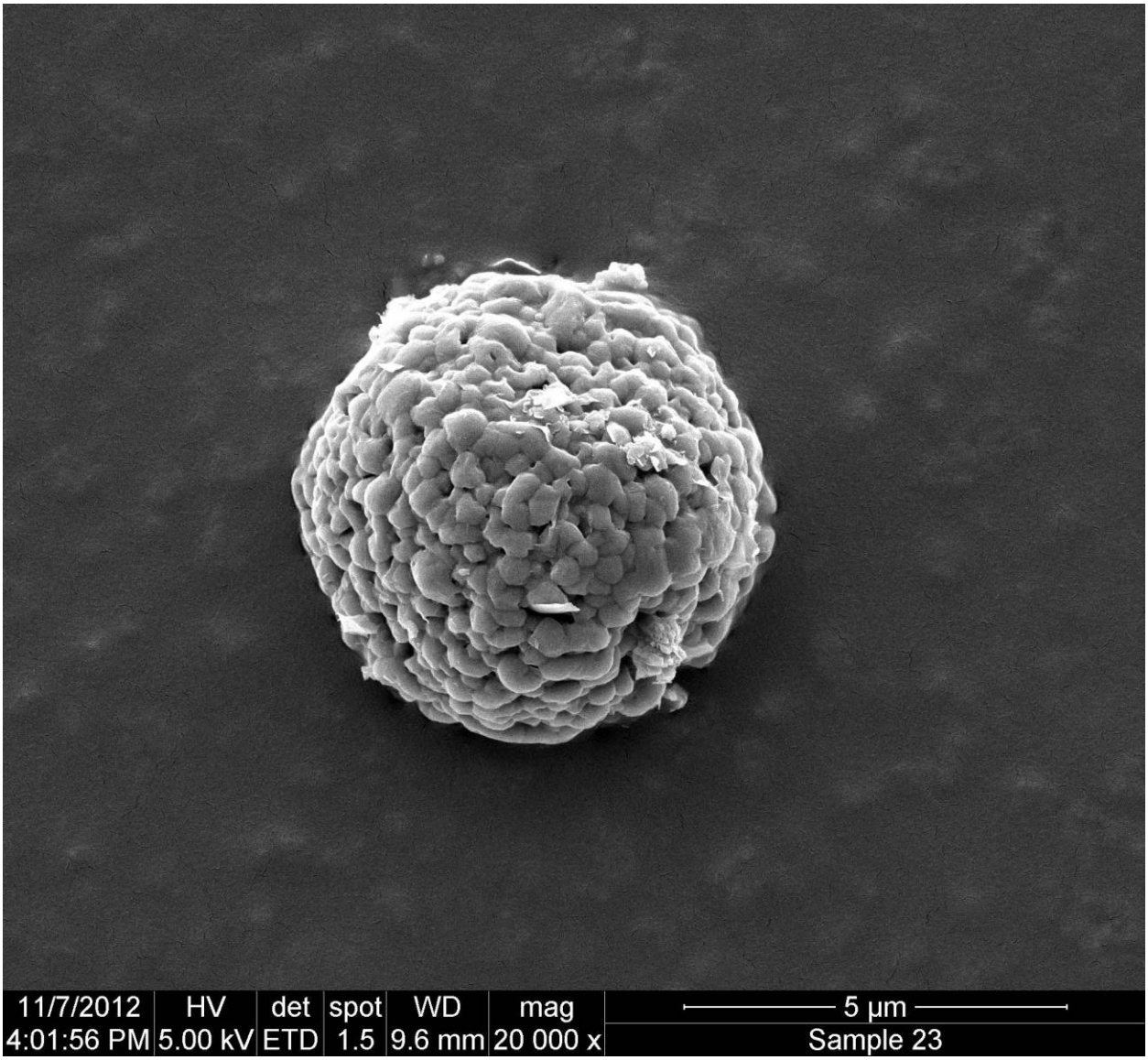
A.8-6: close up SEM image of sanidine from EBS 8



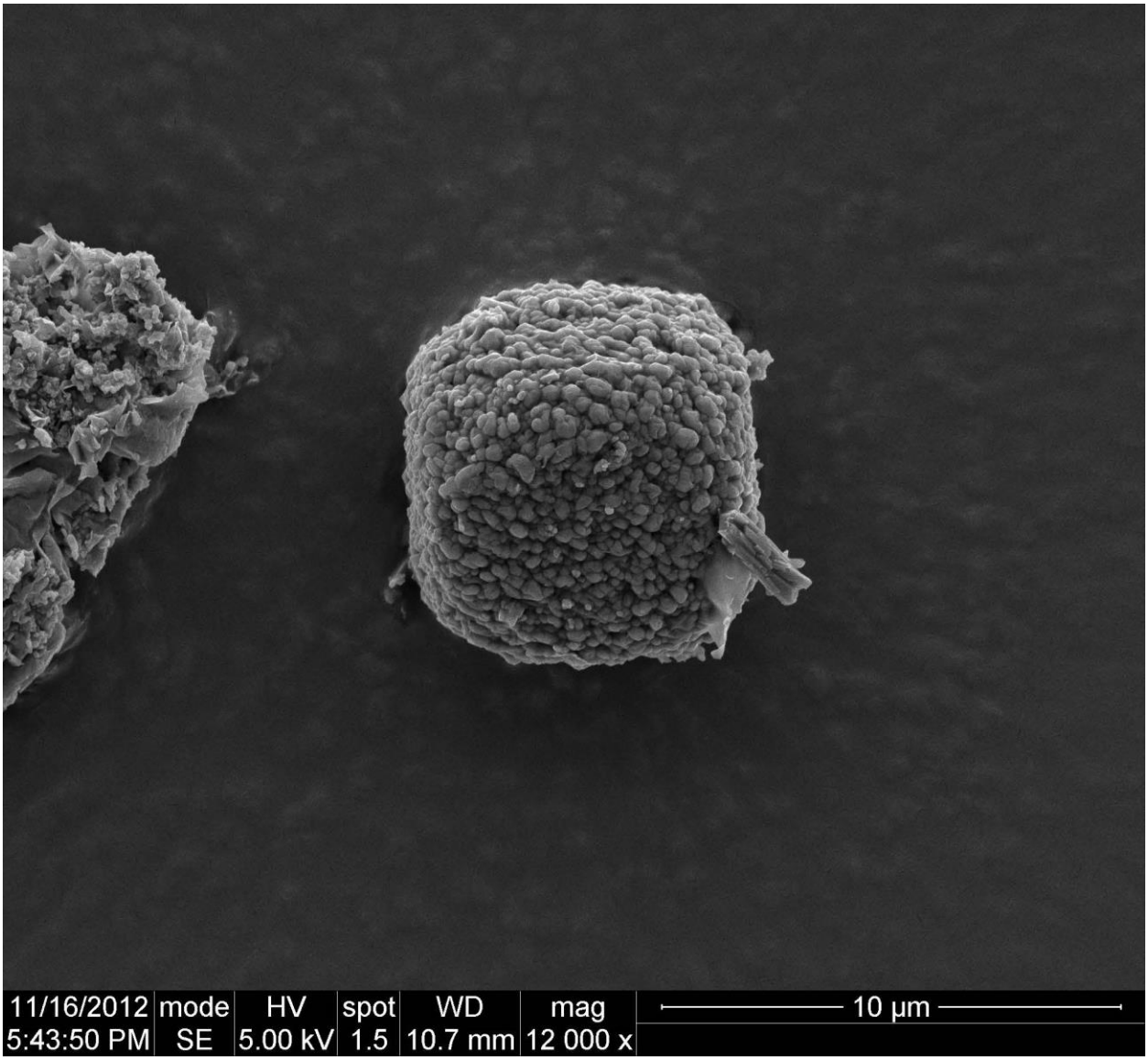
A.8-7: SEM image of analcime growth



A.8-8: SEM image of cubic analcime

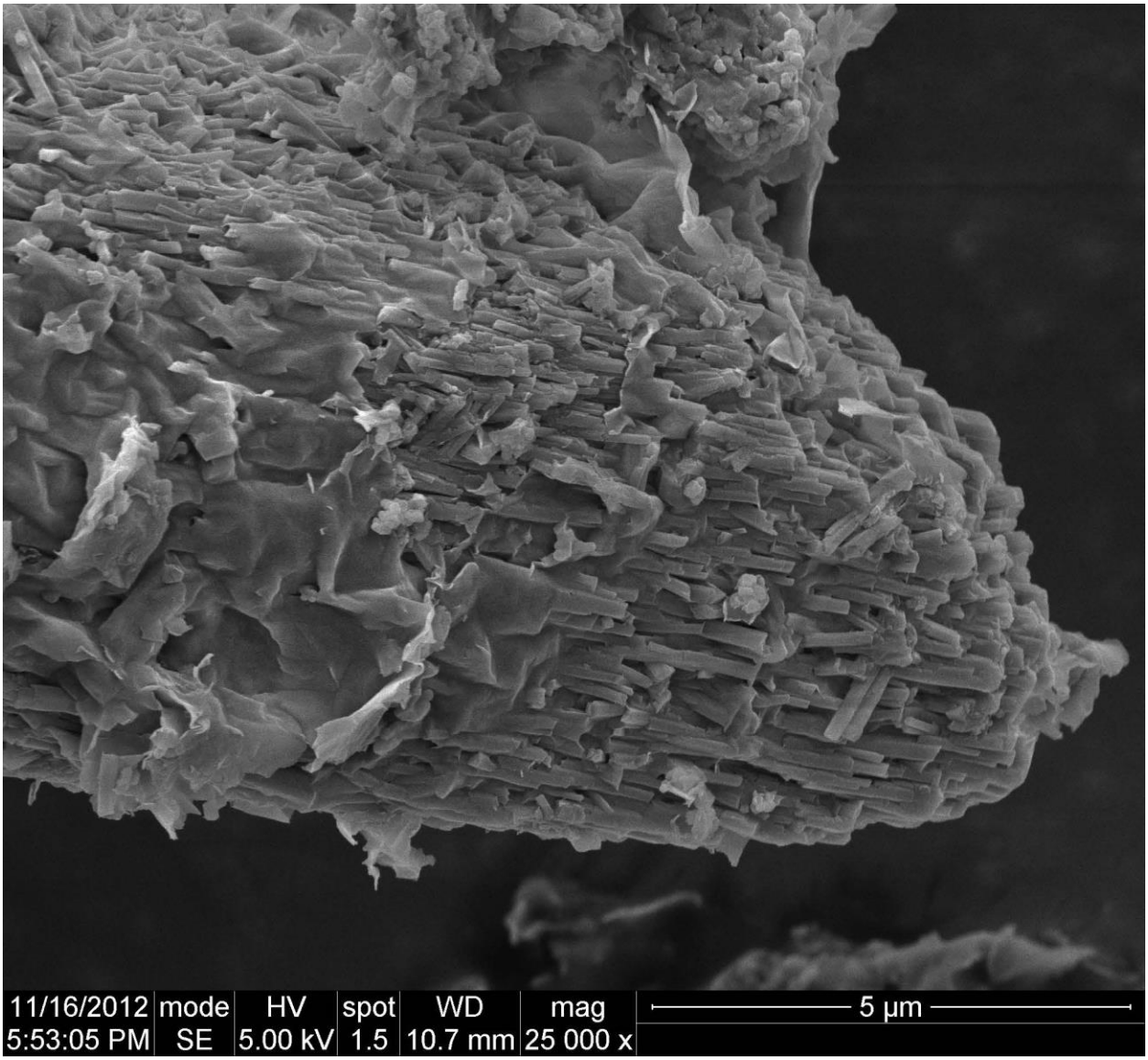


A.8-9: SEM image of octahedral analcime

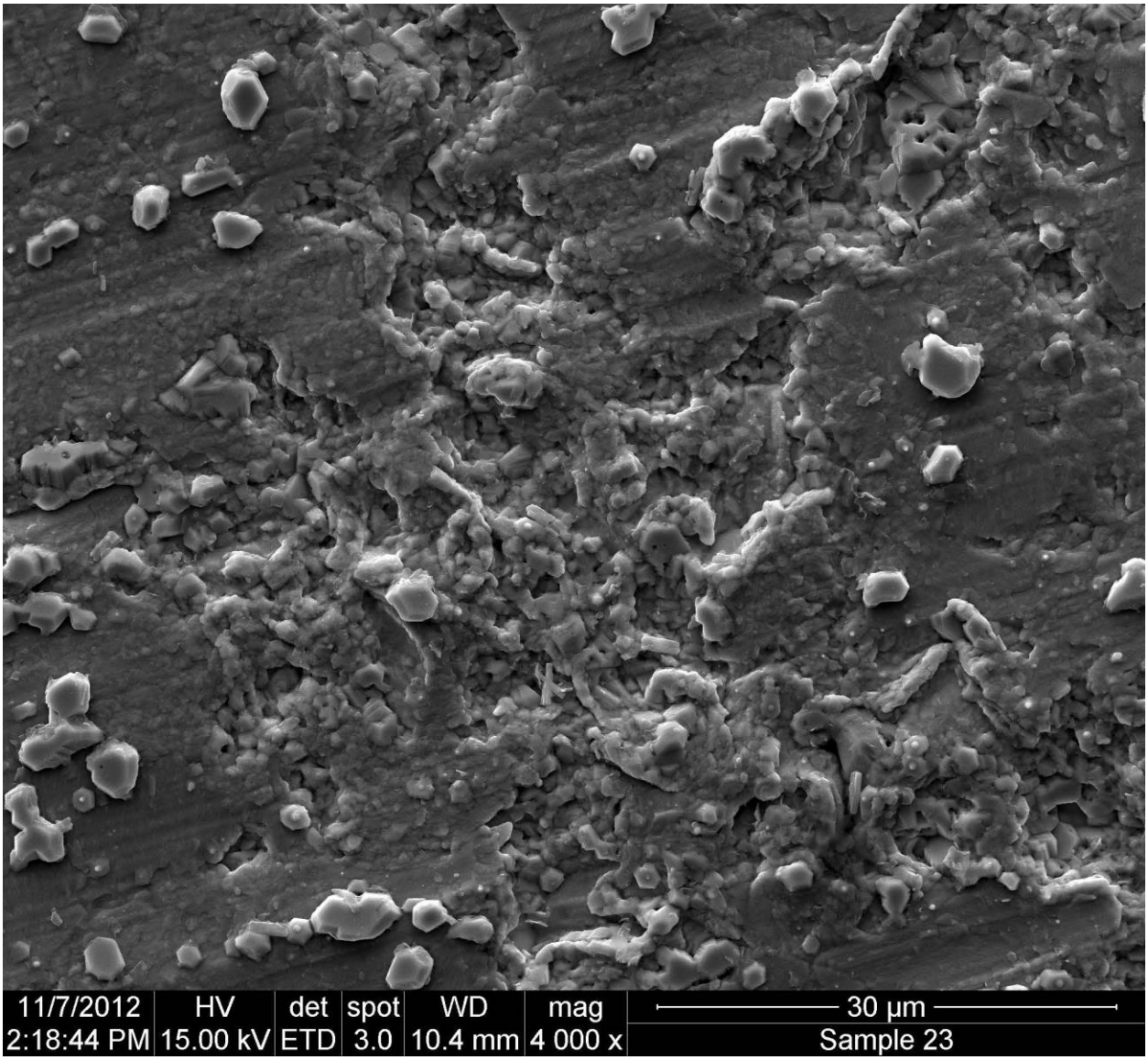


A.8-10: SEM image of rounded square analcime from EBS 8

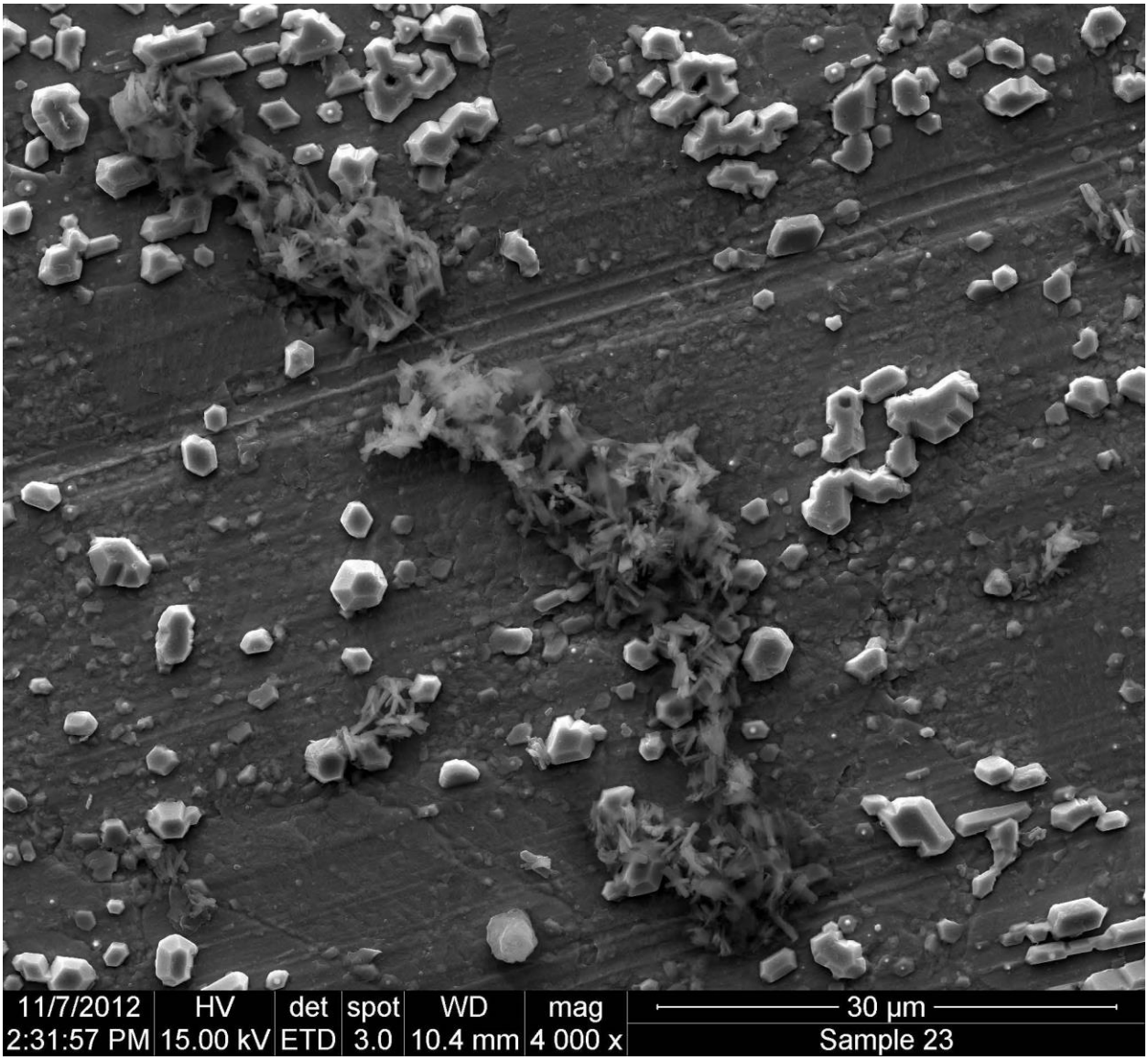
A.8-11: SEM image of octahedra analcime from EBS 8



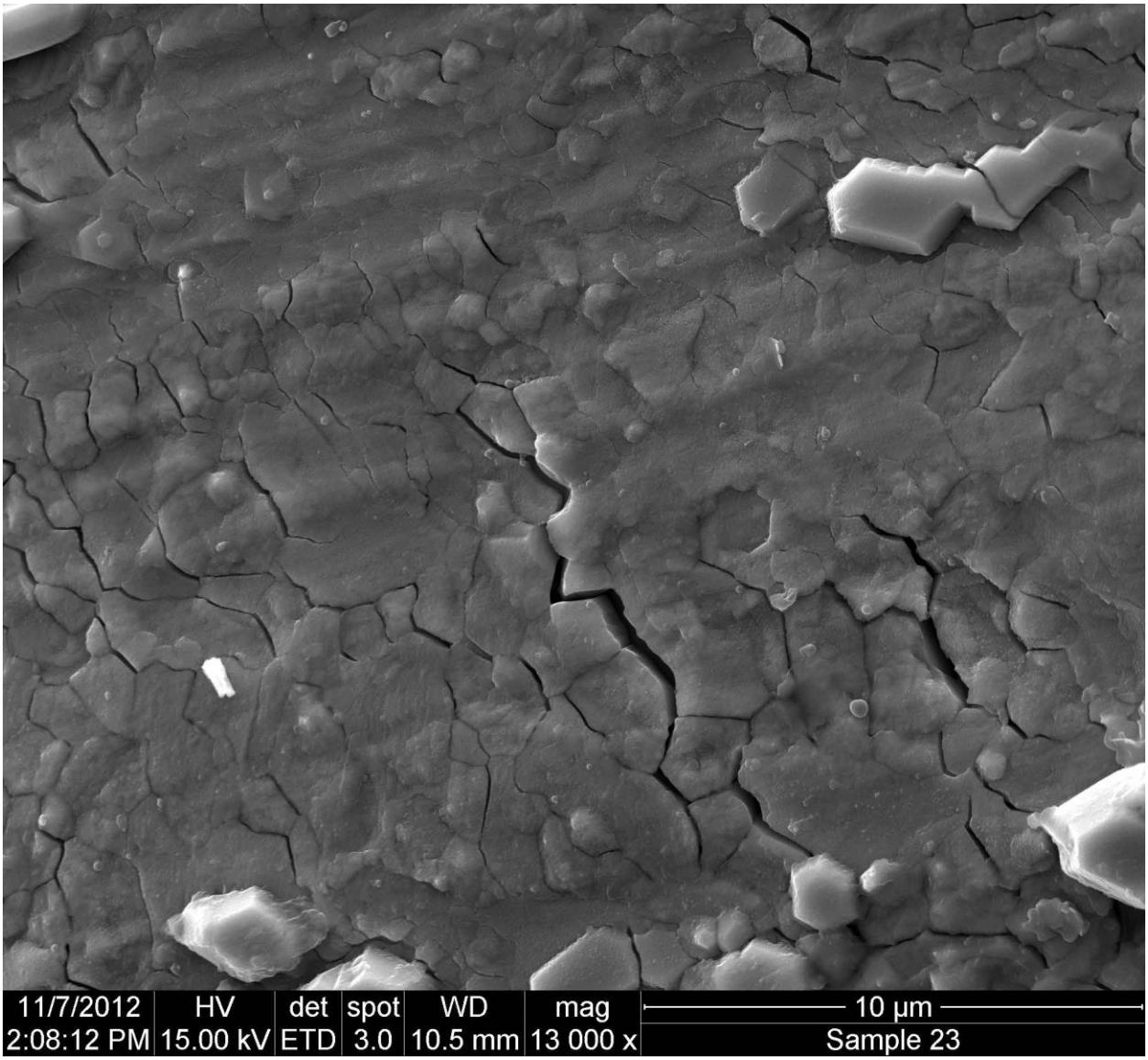
A.8-12: SEM image of clinpotilolite from EBS 8



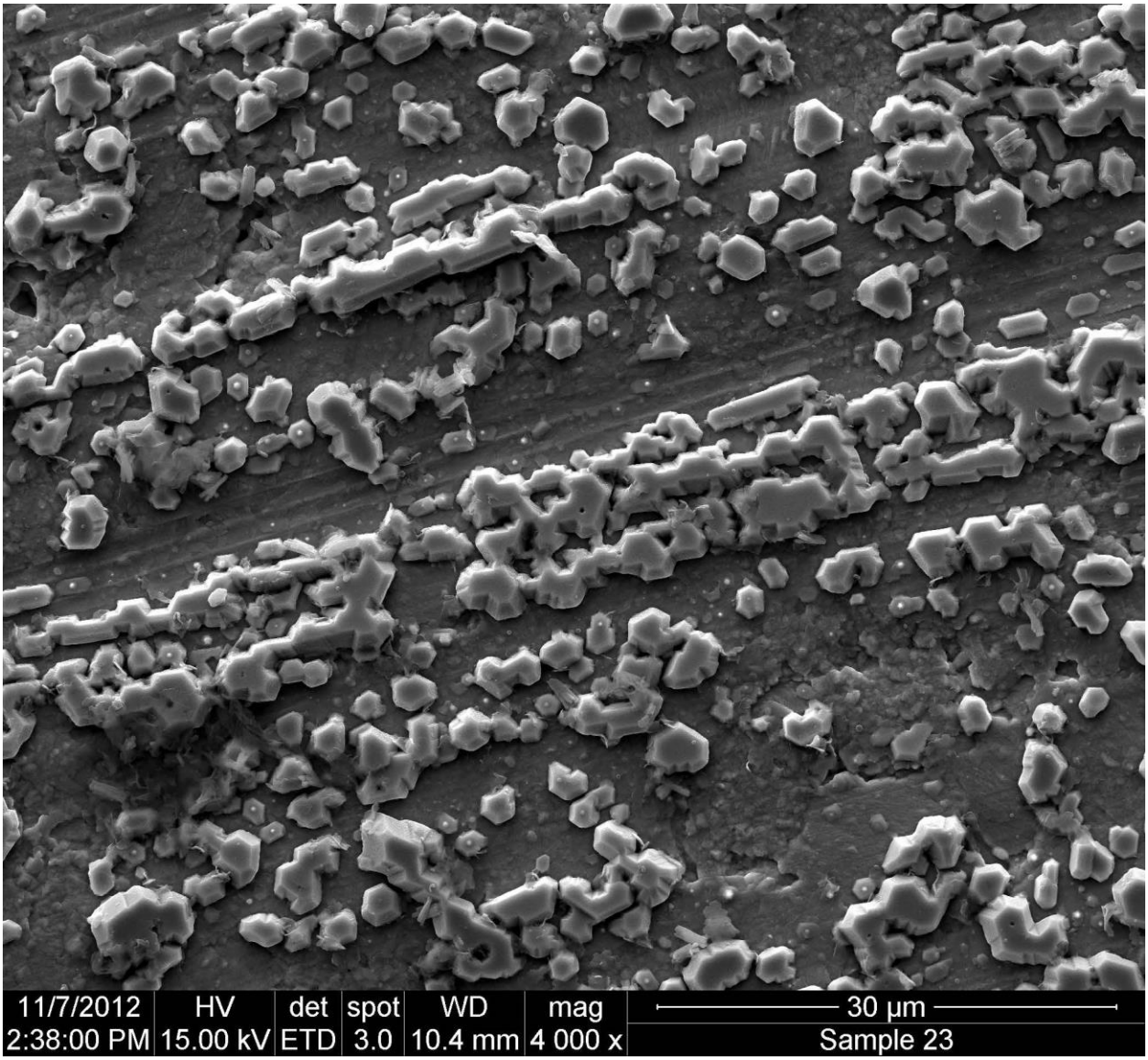
A.8-13: SEM image of sparse chalcocite on copper foil from EBS 8



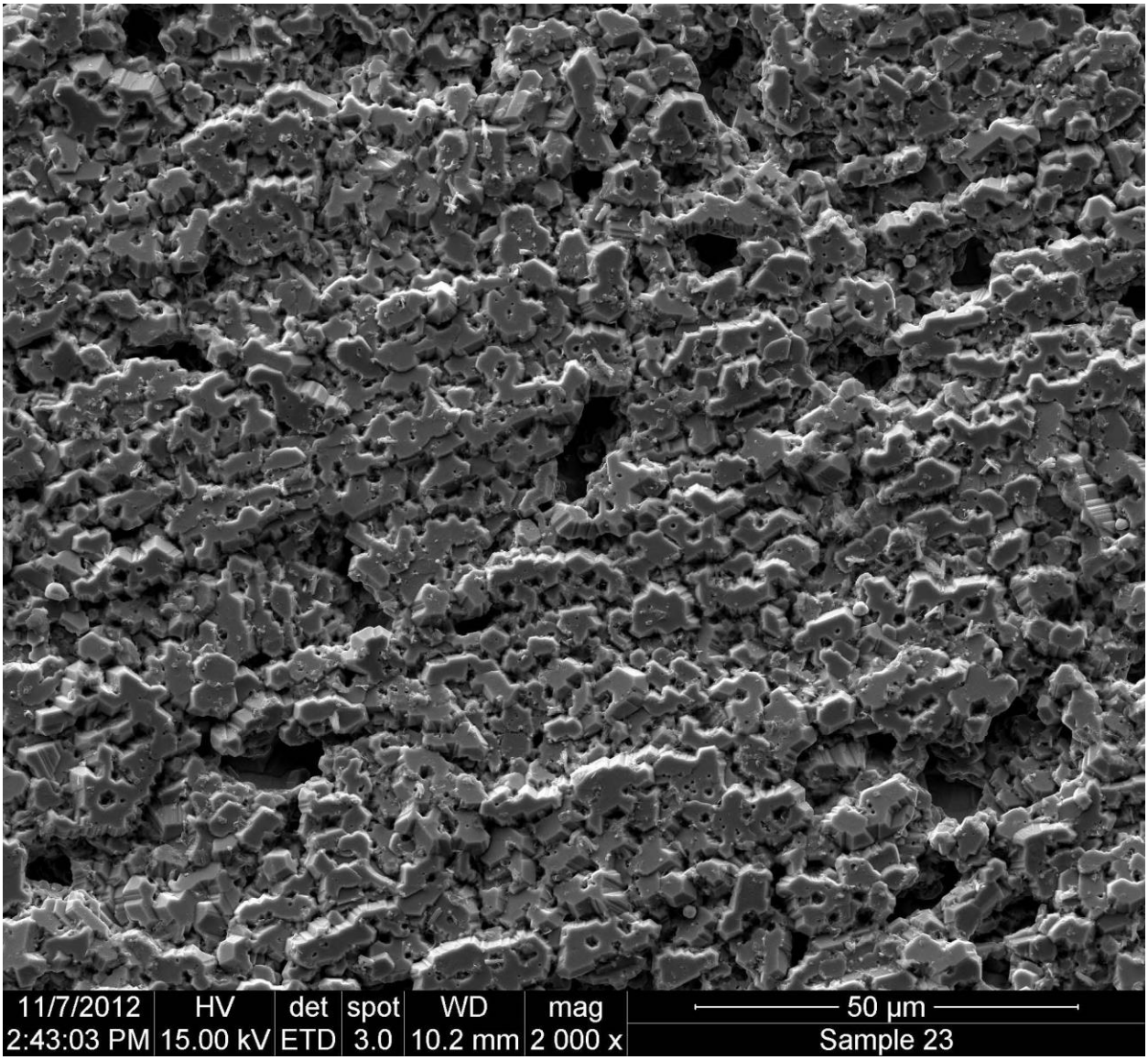
A.8-14: SEM image of chalcocite on copper foil from EBS 8



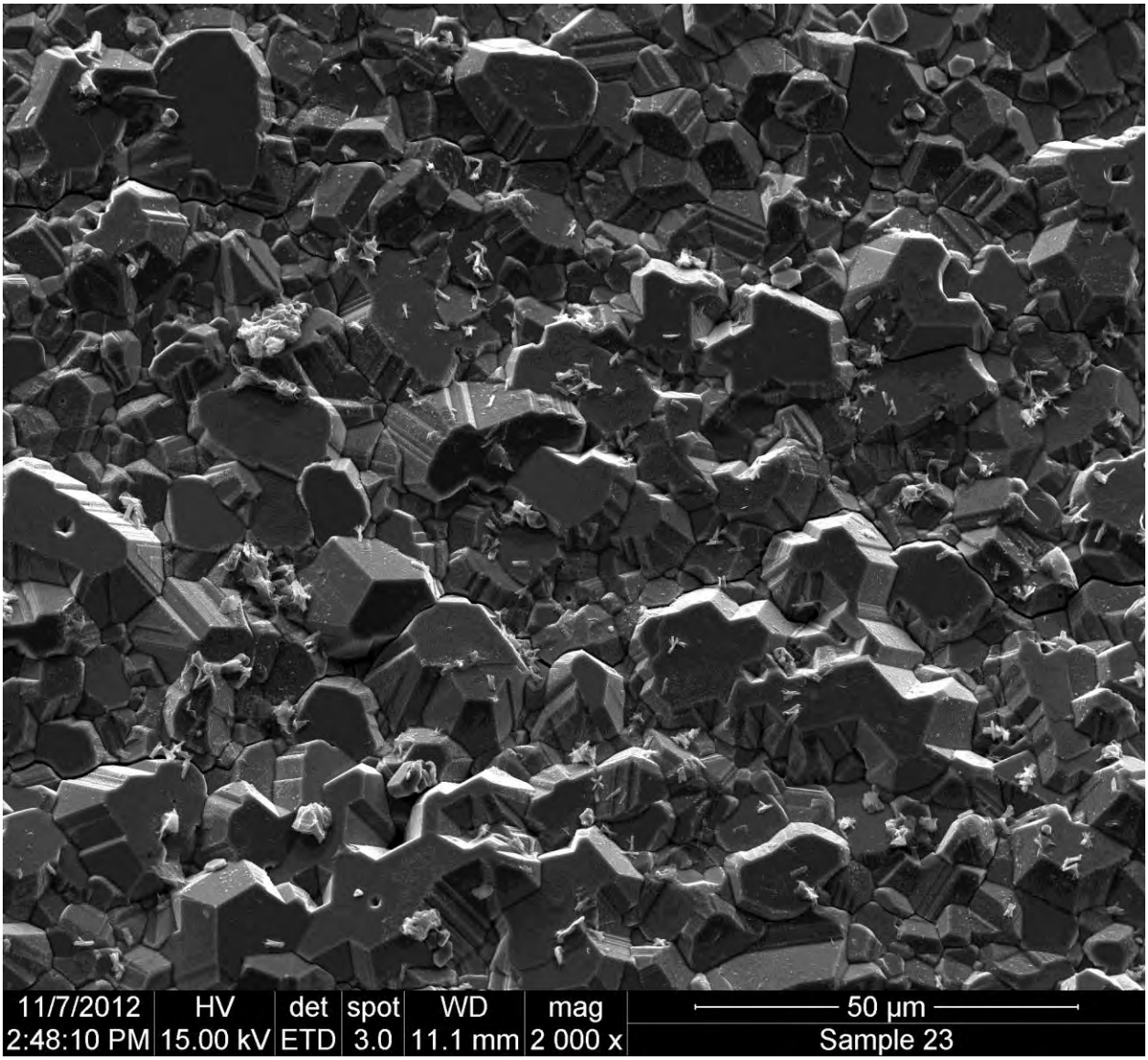
A.8-15: SEM image of crack corrosion on copper from EBS 8



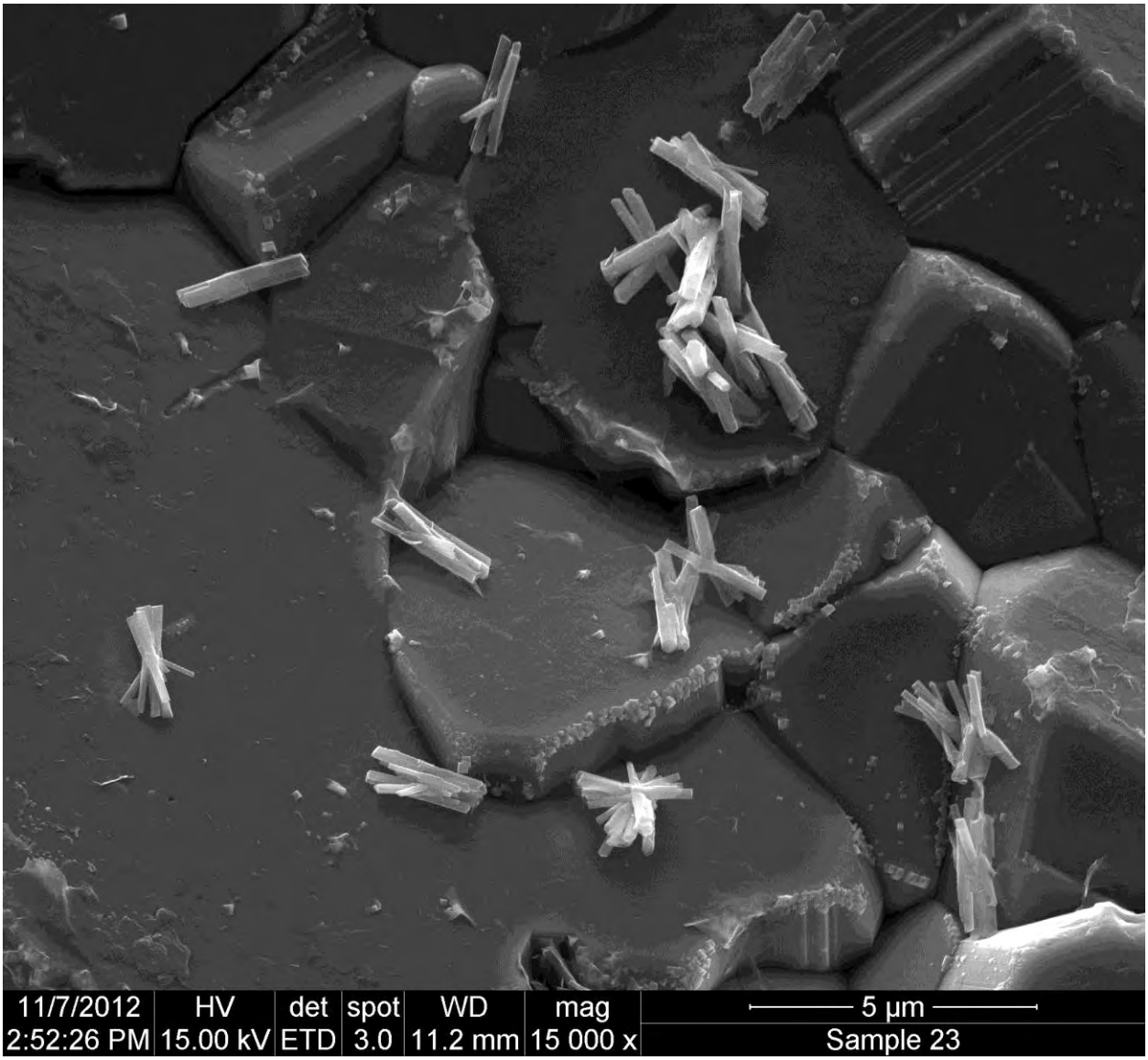
A.8-16: SEM image of oriented chalcocite on copper from EBS 8



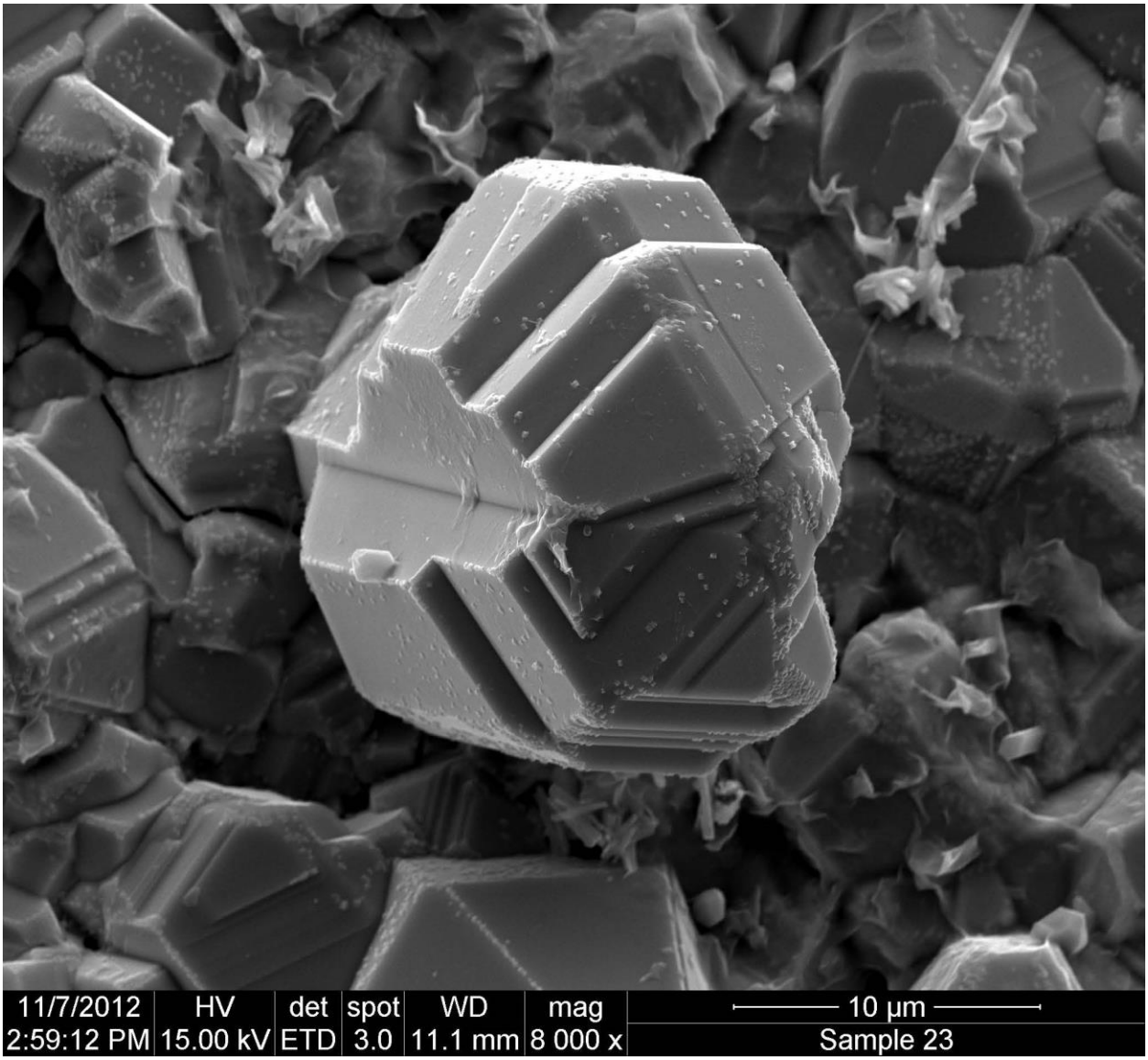
A.8-17: SEM image of chalcocite mat from EBS 8



A.8-18: SEM image of total chalcocite cover from EBS 8



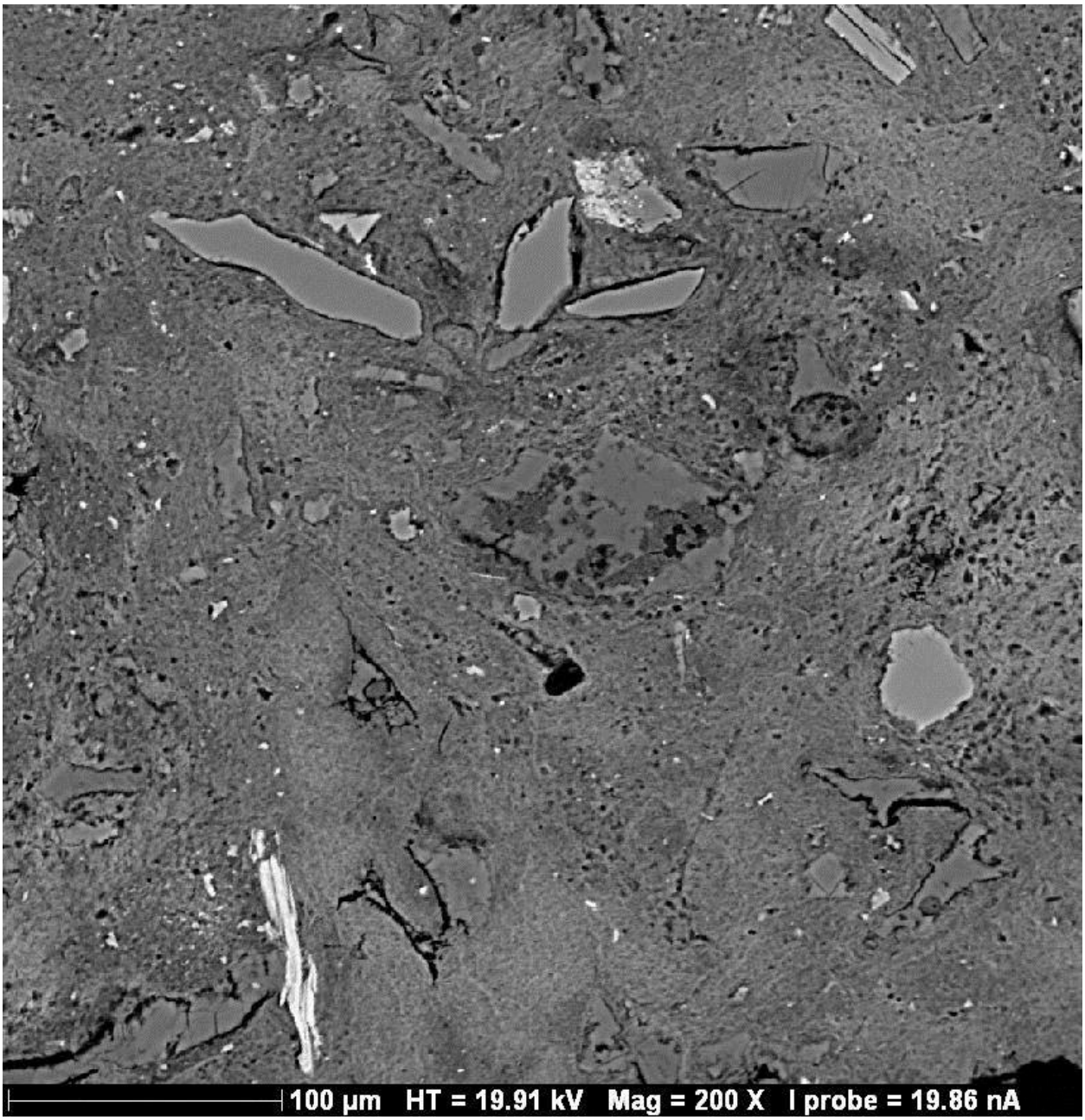
A.8-19: SEM image of atacamite from EBS 8



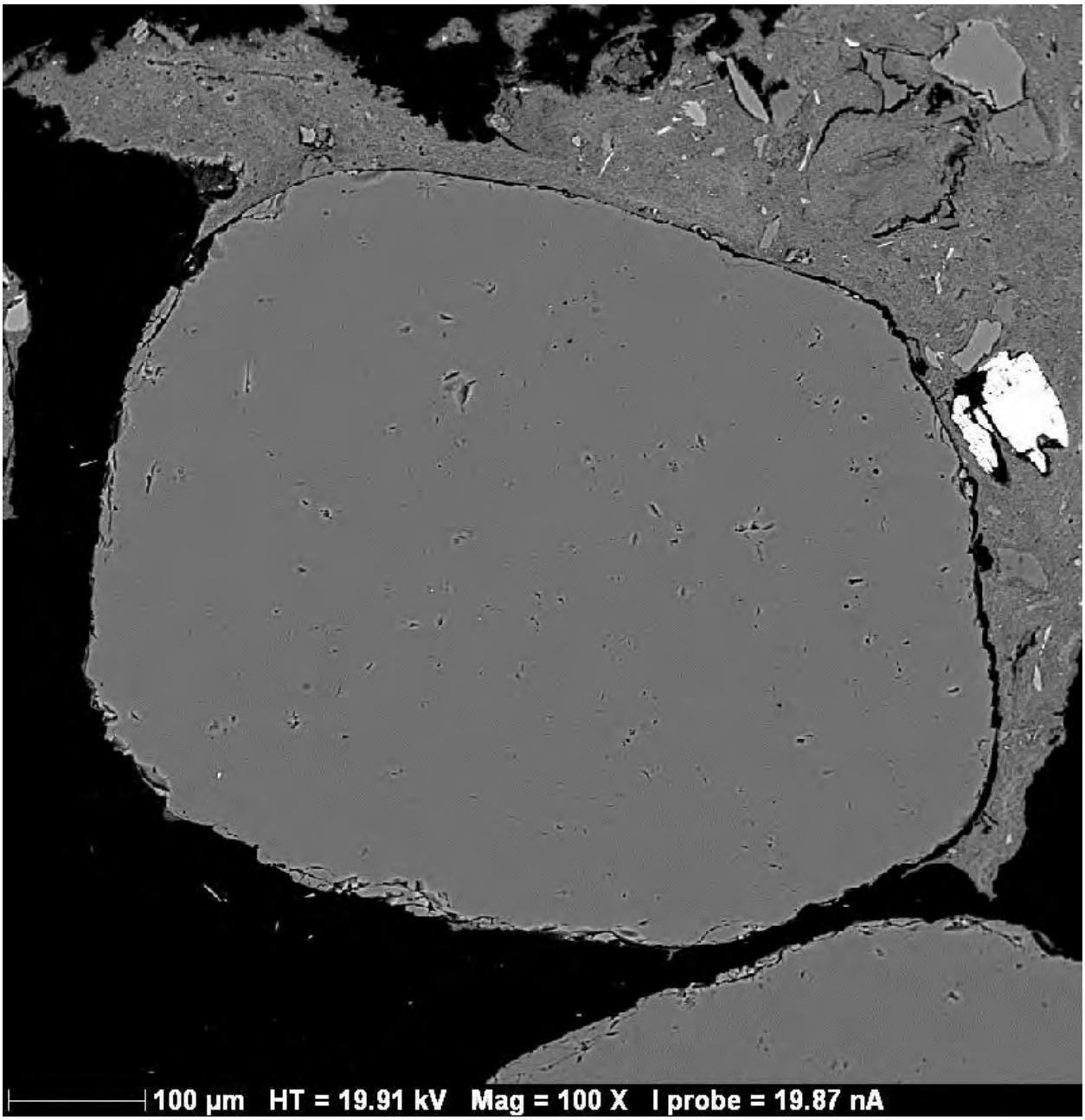
A.8-20: SEM image of perfect chalcocite from EBS 8

Appendix A.9

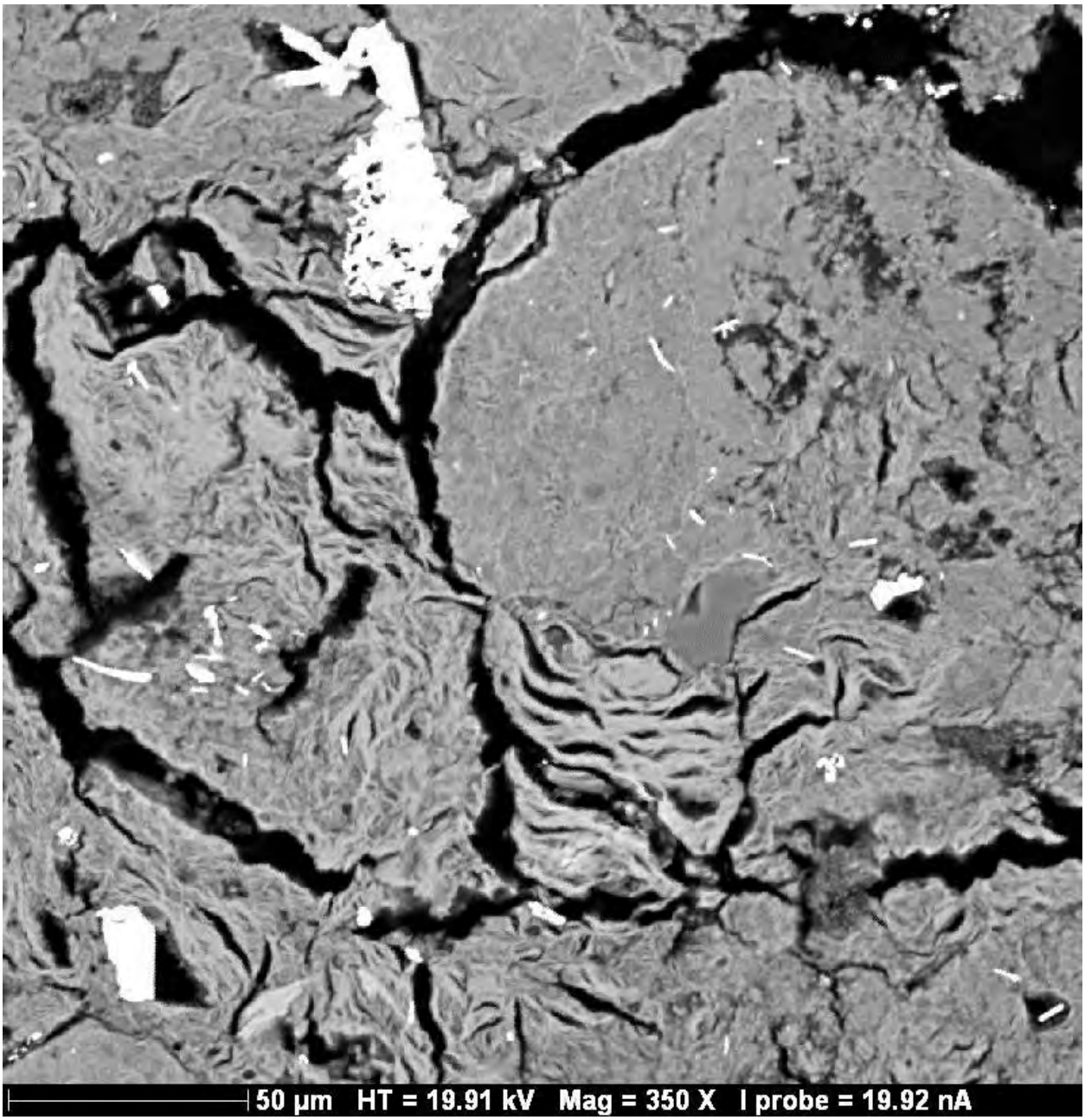
EBS-9 Step temperature increase (100, 200, 300 ^{o}C) at 150 bar for 5 weeks run with Quartz Sand



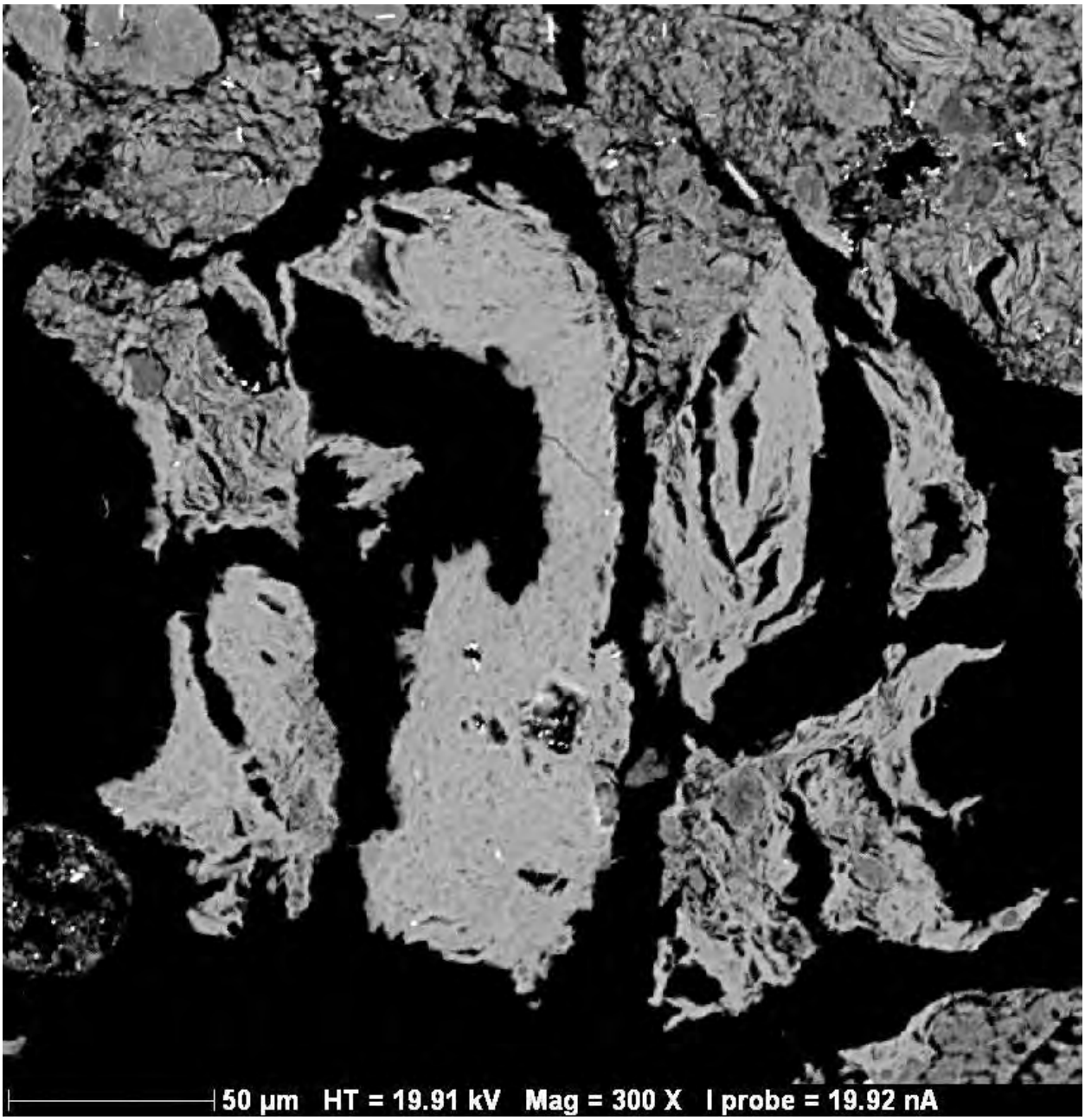
A.9-1: Back Scattered Electron image of EBS 9 thin section depicting matrix structure



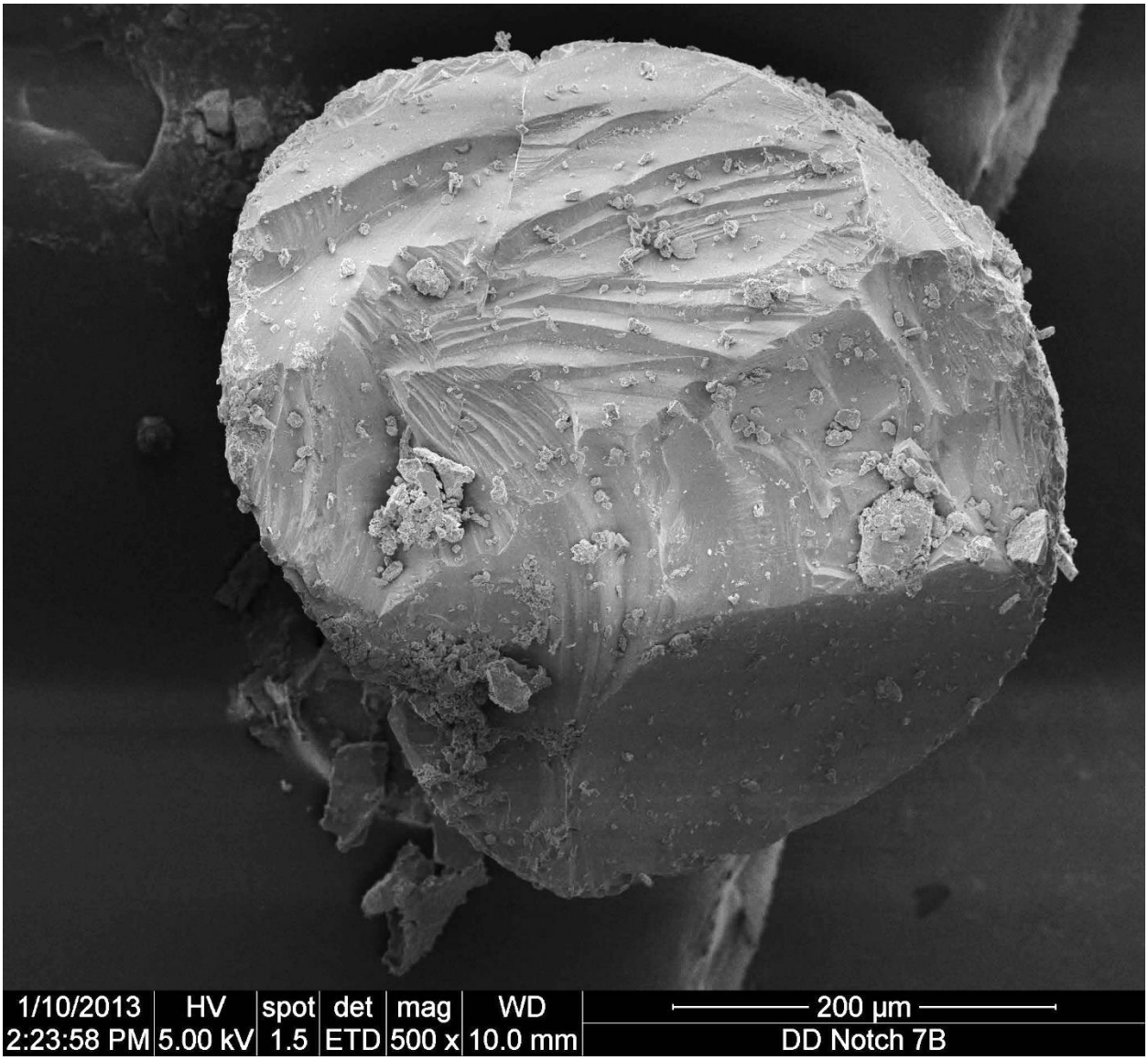
A.9-2: Back Scattered Electron image of EBS 9 thin section depicting quartz grain



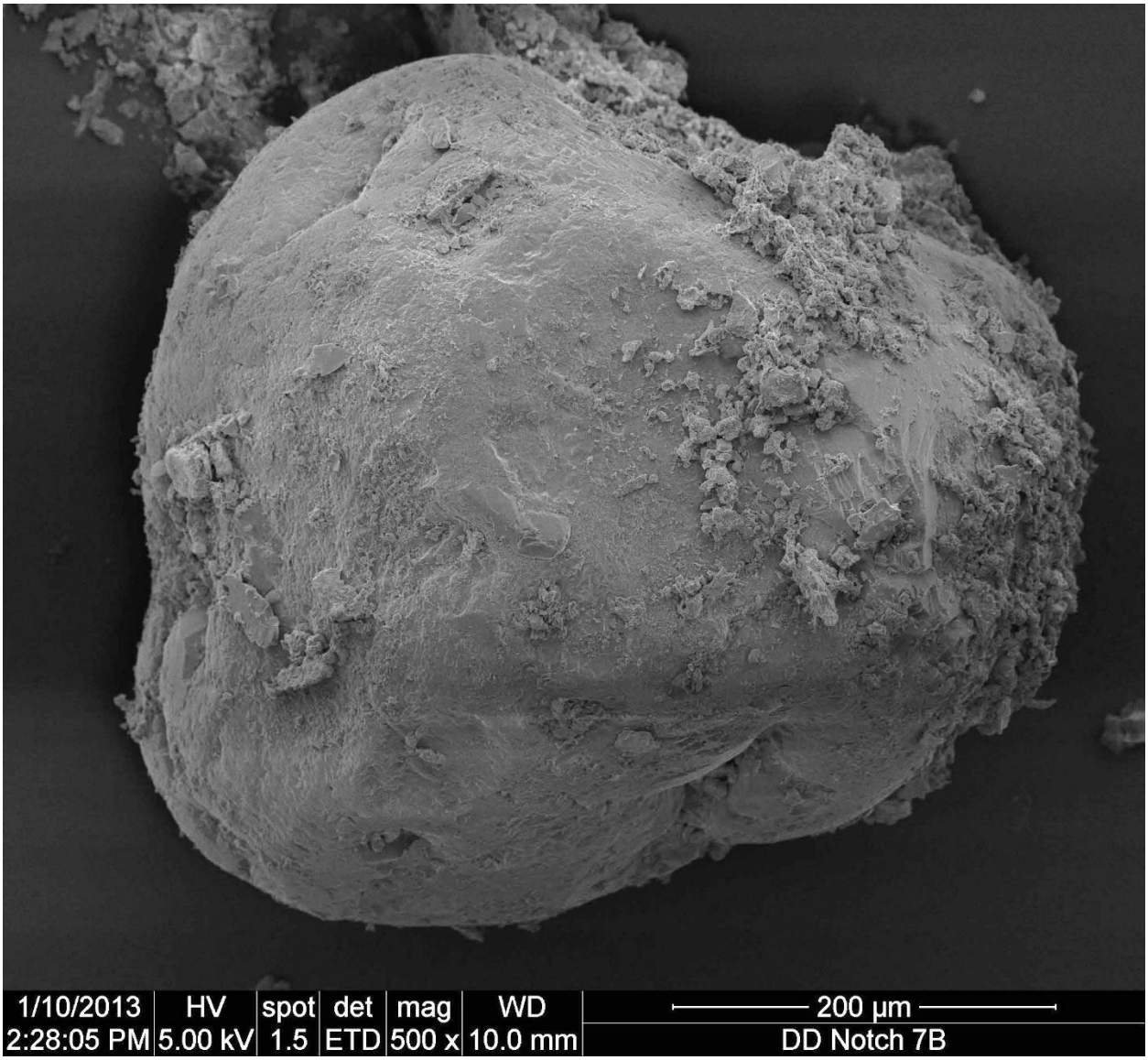
A.9-3: Back Scattered Electron image depicting chlorite (?) / stipnomalene (?) mineral growth



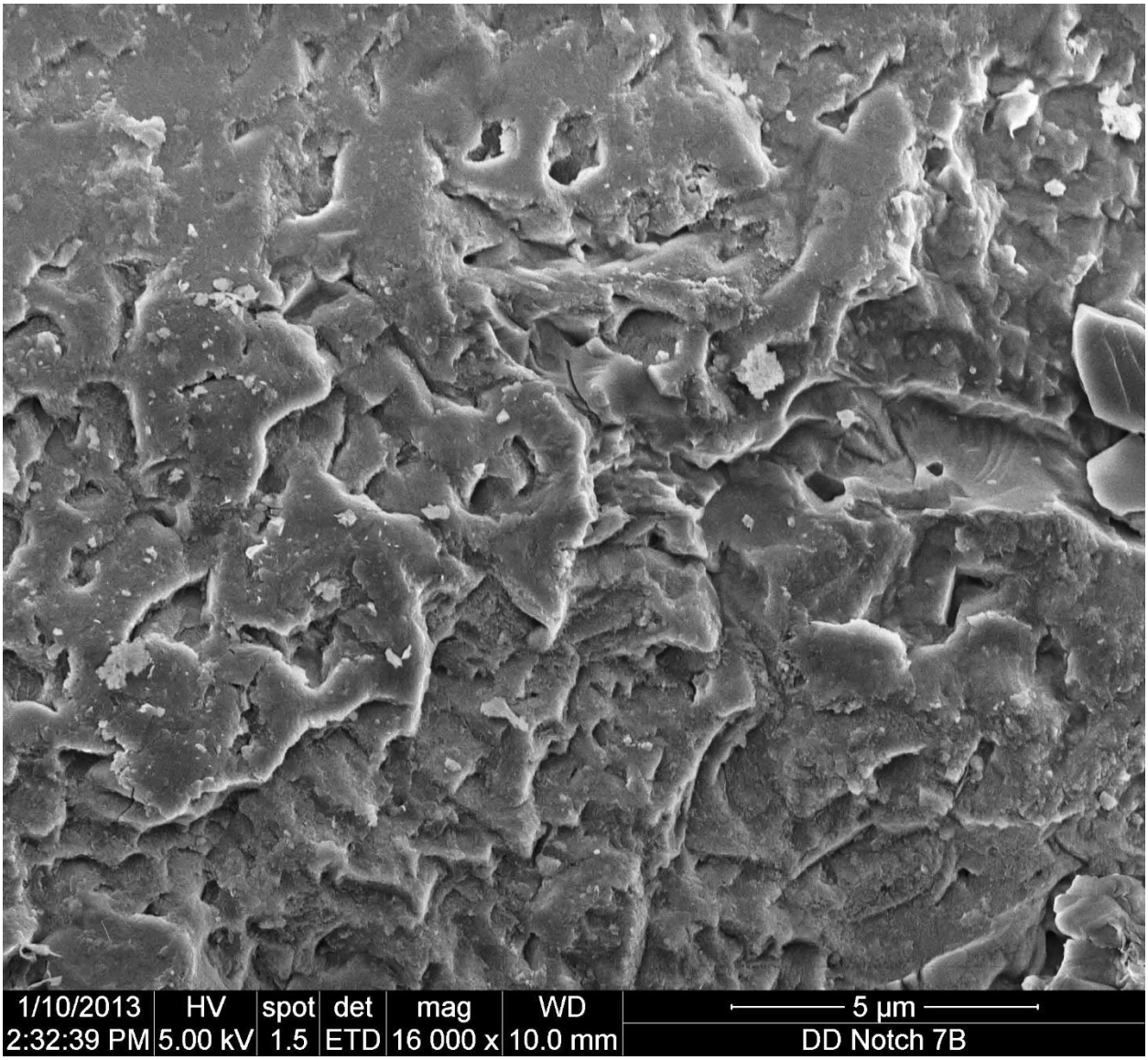
A.9-4: Back Scattered Electron image depicting chlorite (?) / stipnomalene (?) mineral growth



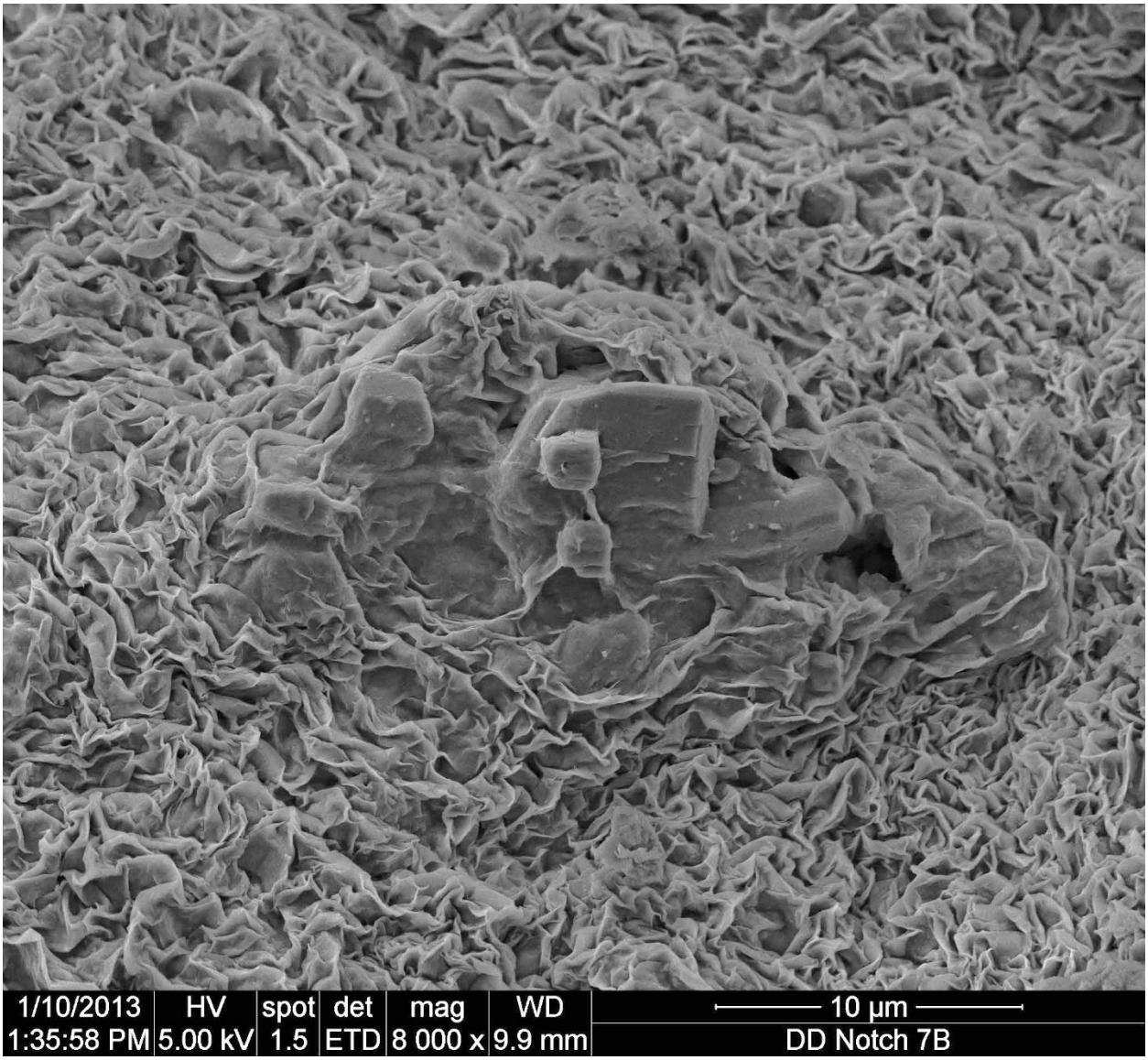
A.9-5: SEM image of quartz grain



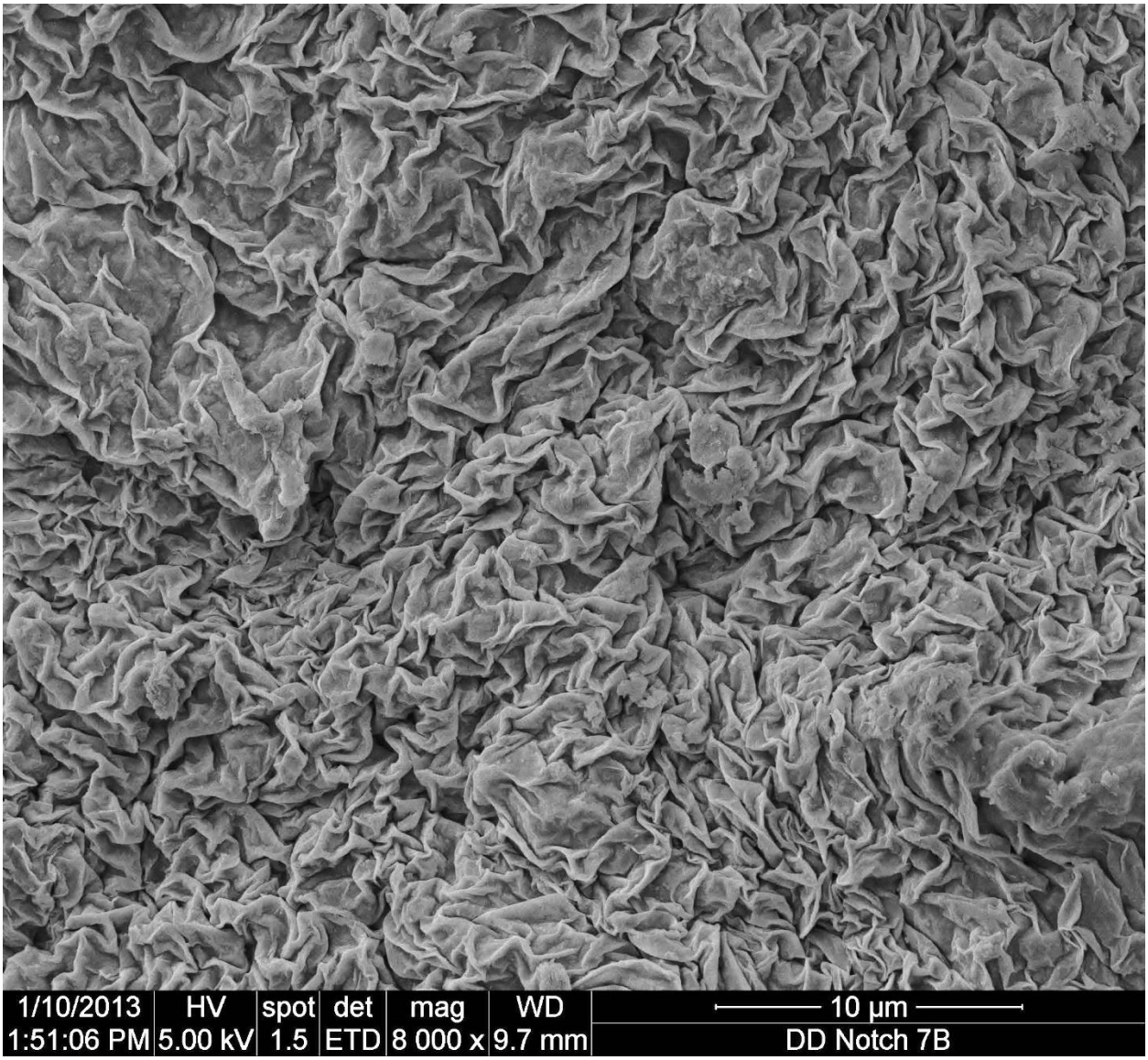
A.9-6: SEM image of rounded quartz grain from EBS 9



A.9-7: SEM image of hi magnification quartz surface from EBS 9



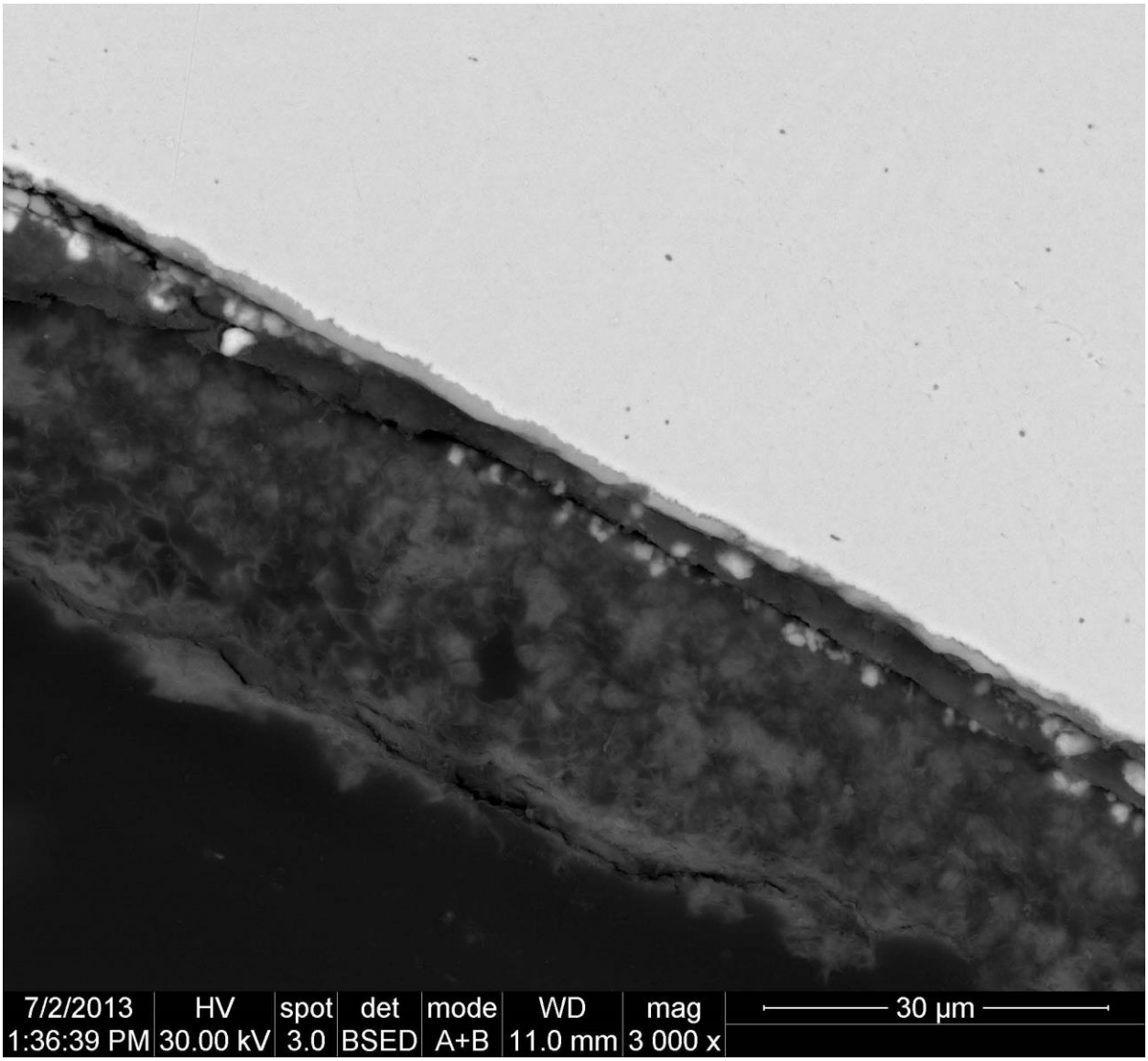
A.9-8: SEM image of quartz in smectite from EBS 9



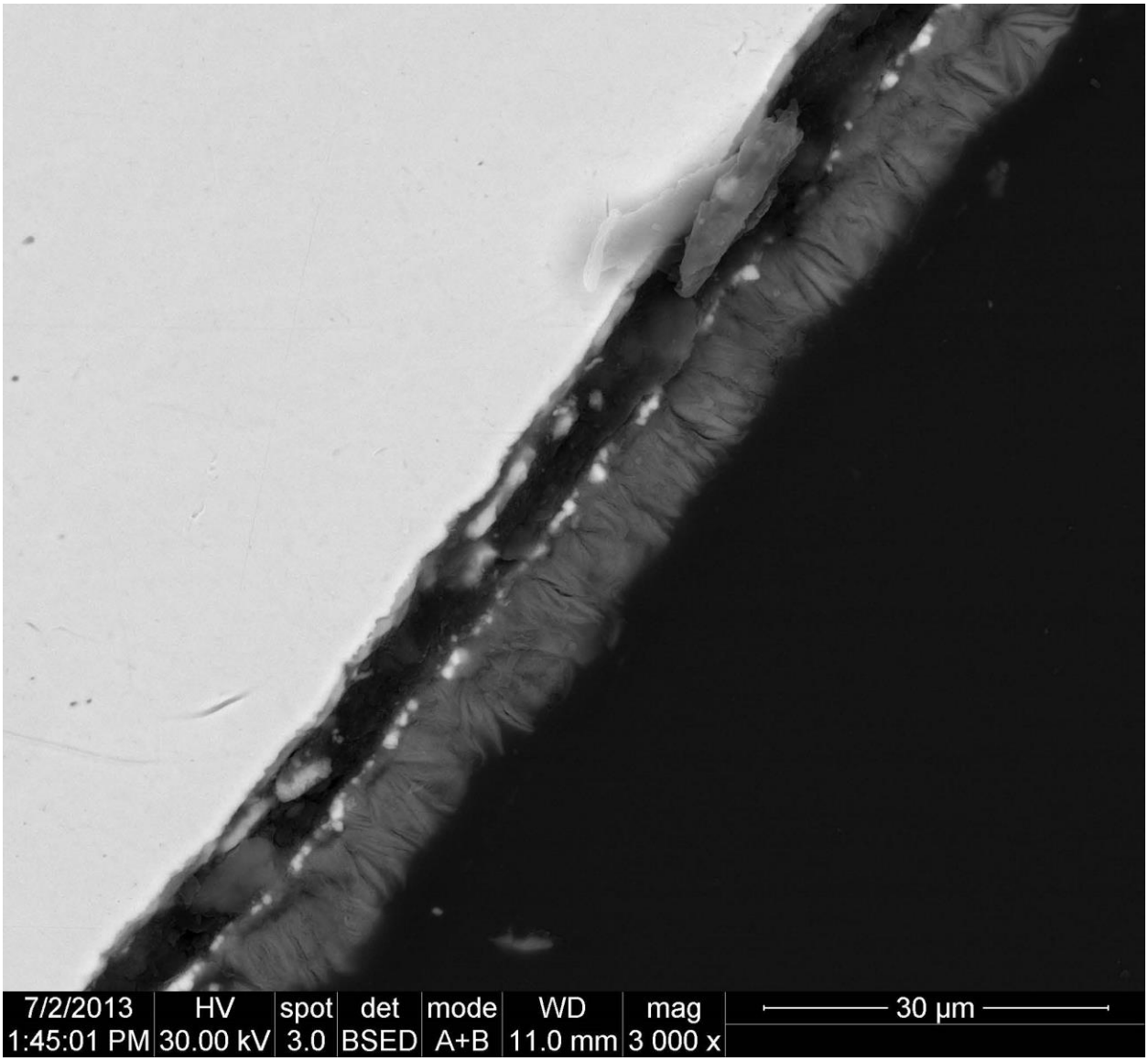
A.9-9: SEM image of smectite

Appendix A.10

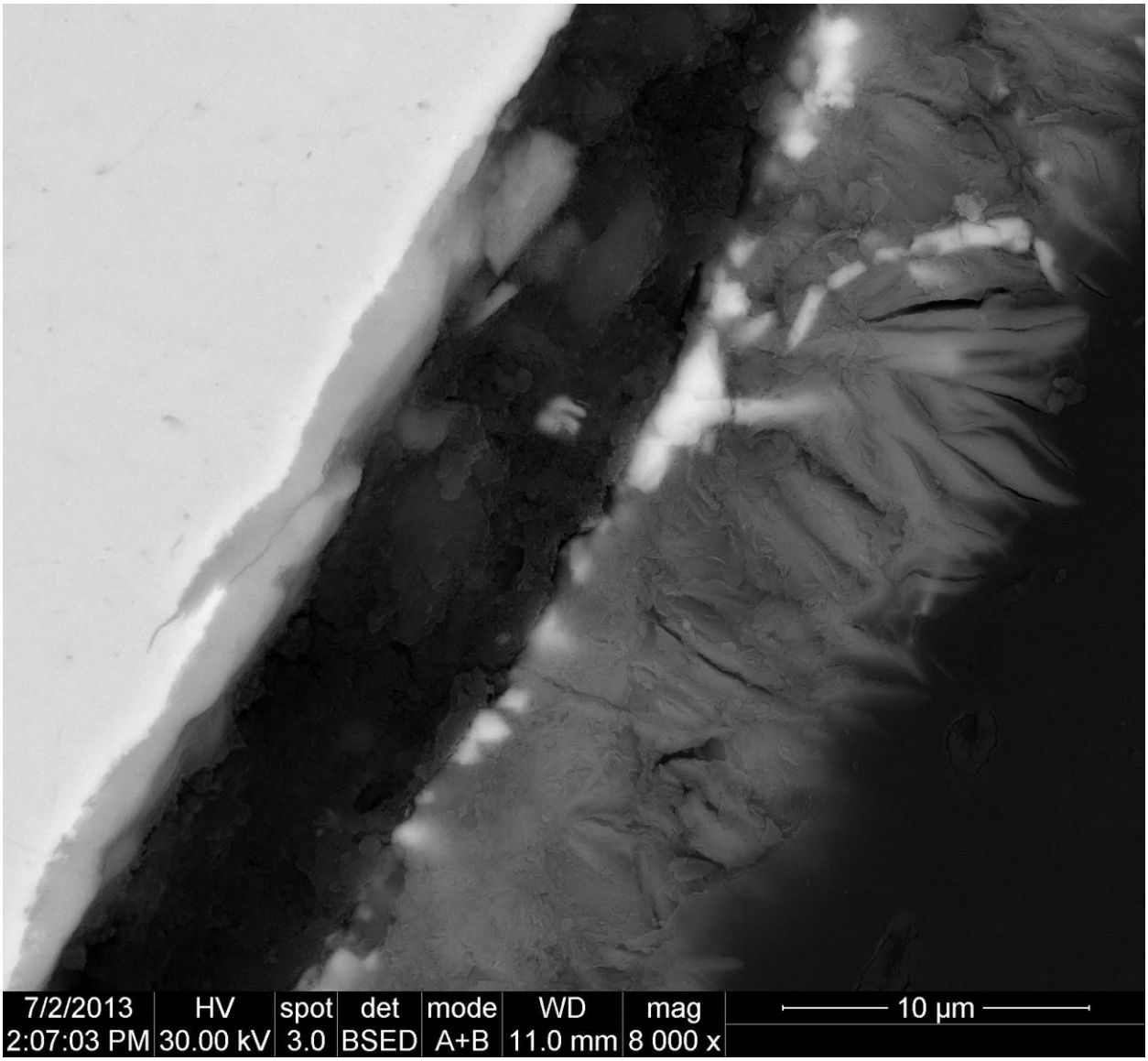
EBS-10 Isothermal at 300°C and 150 bar for 6 weeks run with 316 Stainless Steel



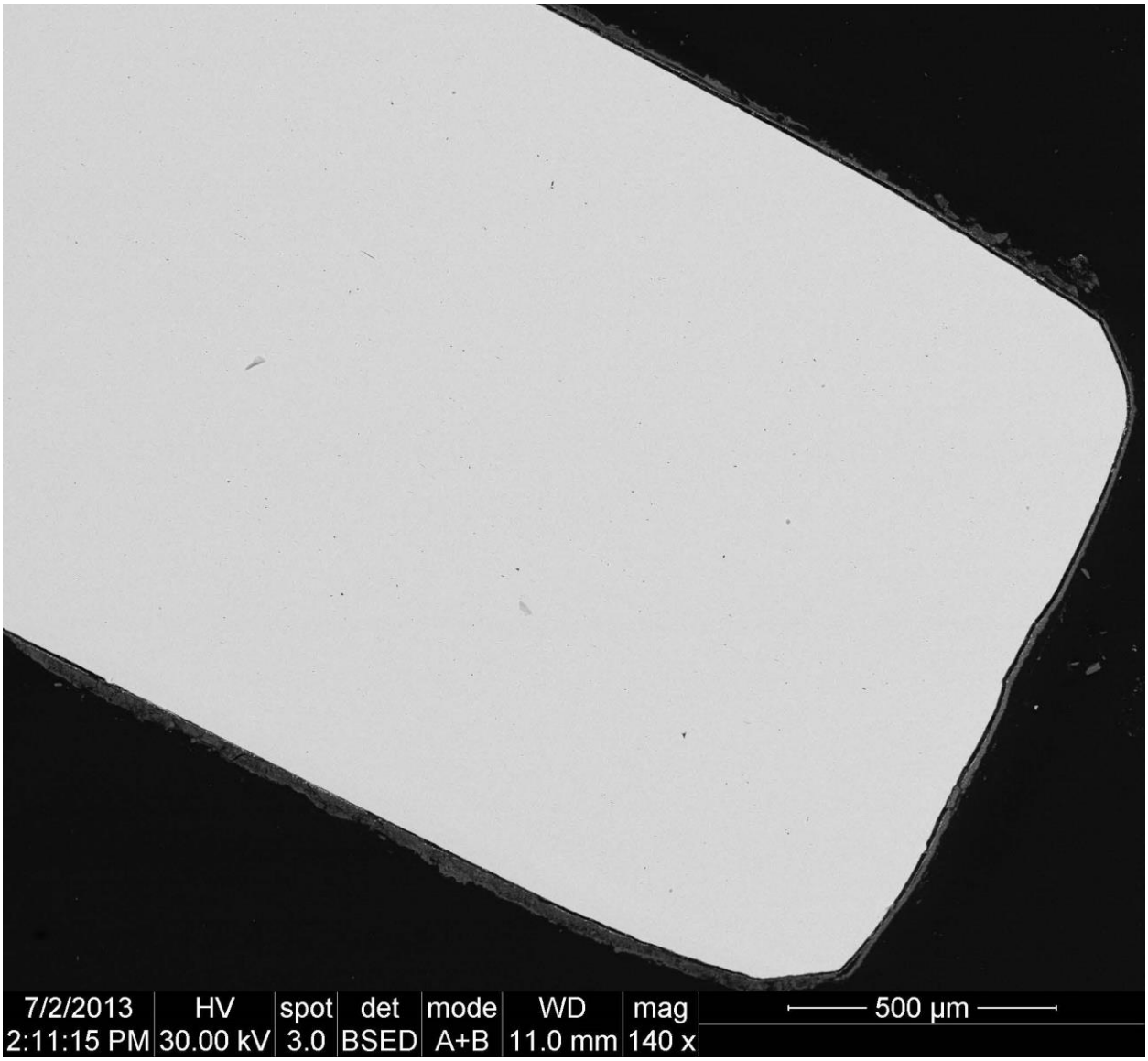
A.10-1 Back Scattered Electron image of chromium rich clay interface on 316 Stainless Steel



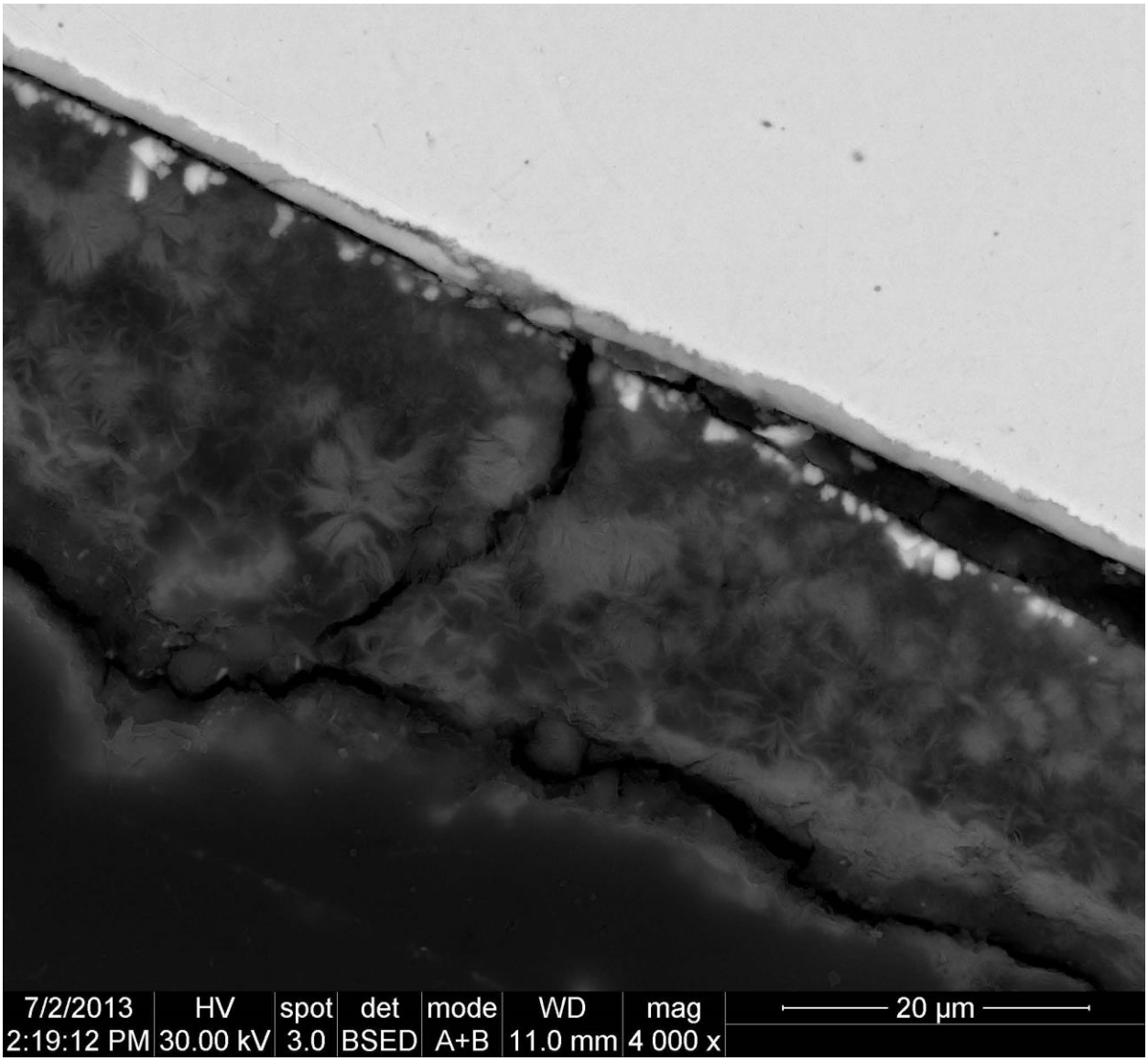
A.10-2: Back Scattered Electron image of clay interface on 316 stainless steel .Note Fe-saponite blades growing perpendicular to steel surface



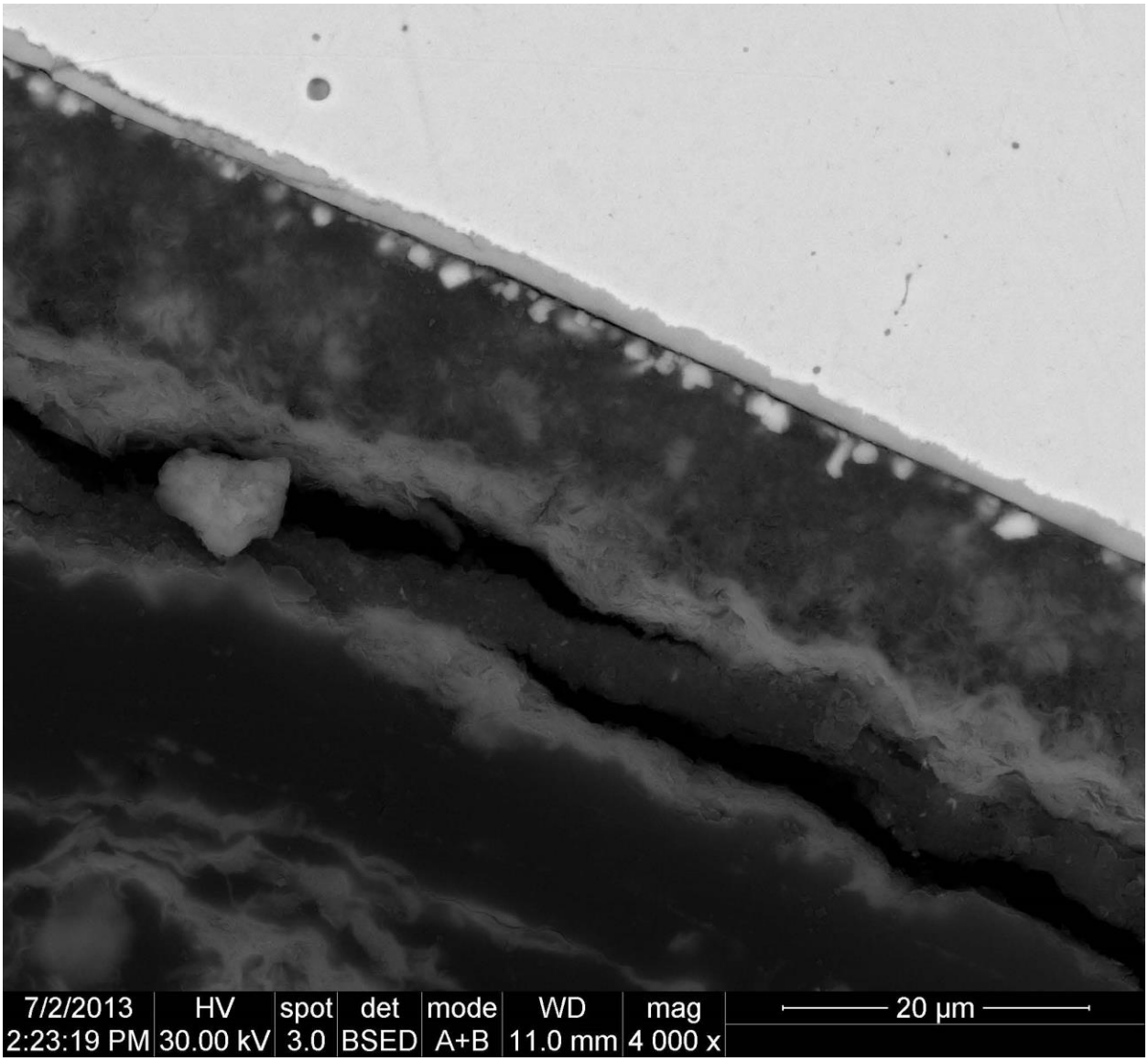
A.10-3: Back Scattered Electron image of clay interface on 316 stainless steel .Note Fe-saponite blades growing perpendicular to steel surface



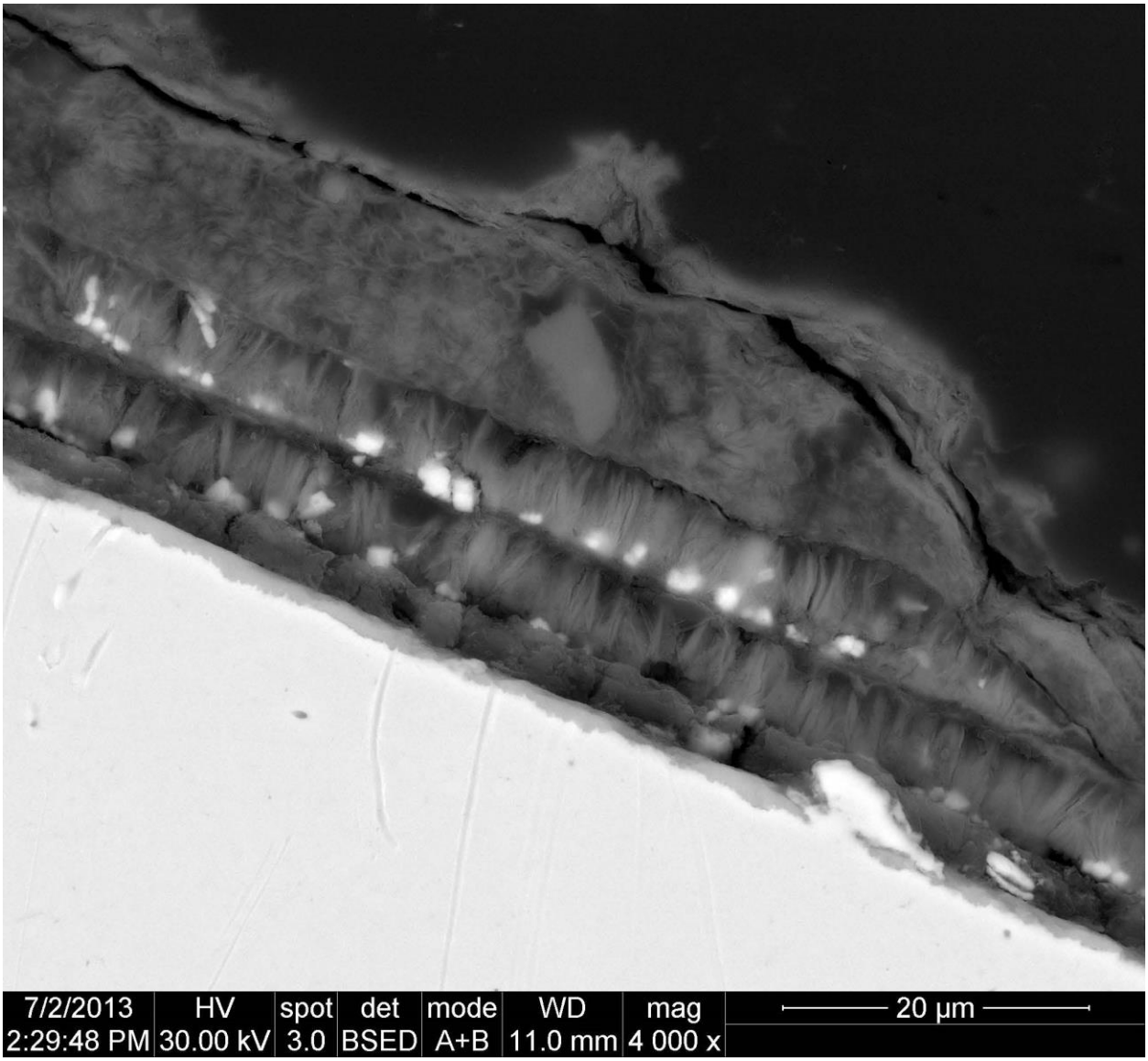
A.10-4: Back Scattered Electron image(Low magnification) of steel coupon from EBS 10



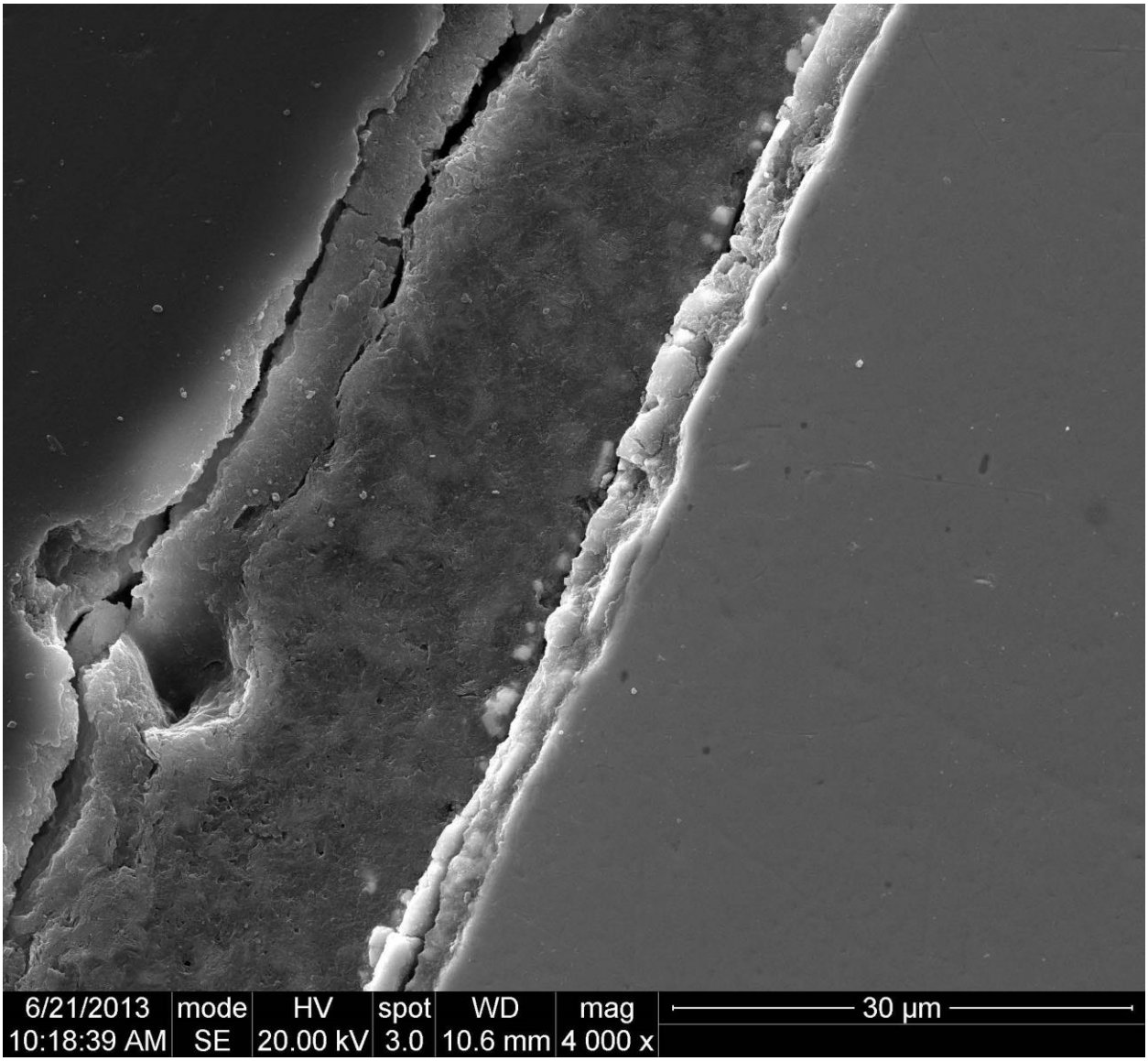
A.10-5: Back Scattered Electron image image of saponite rosettes



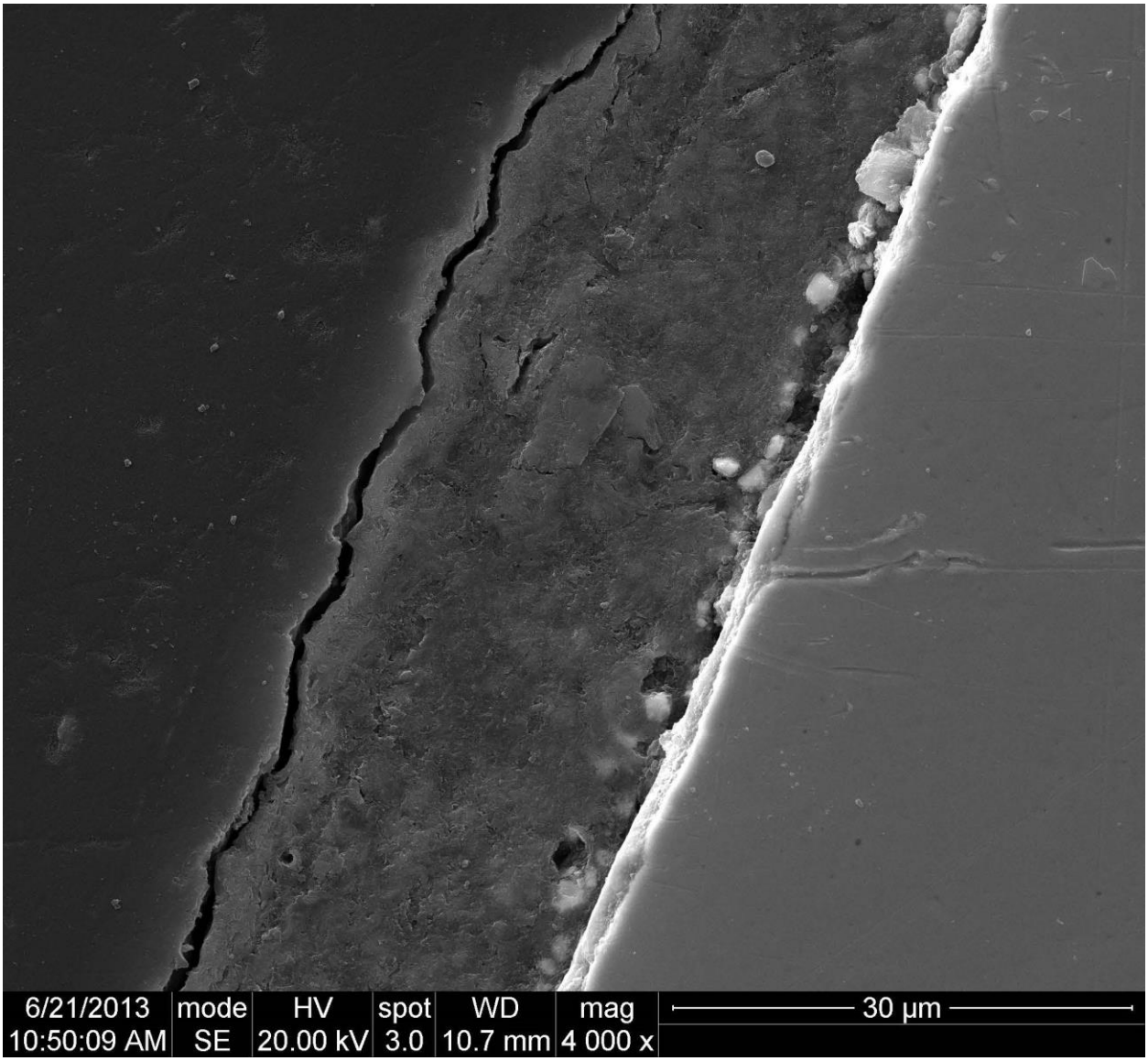
A.10-6: Back Scattered Electron image of multiple layers of clay interface from EBS 10



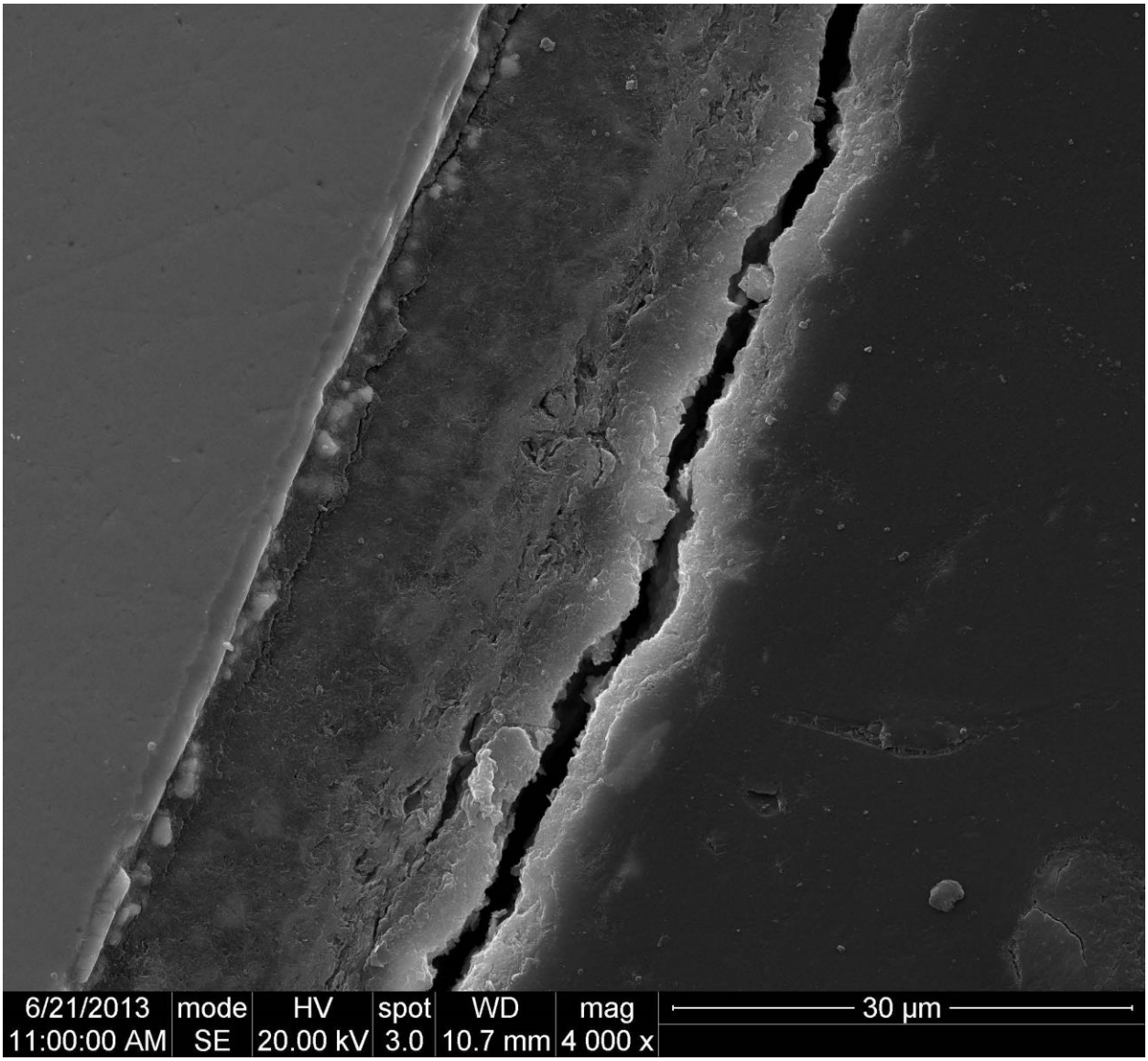
A.10-7: Back Scattered Electron high magnification image of multiplealteration layers from EBS 10



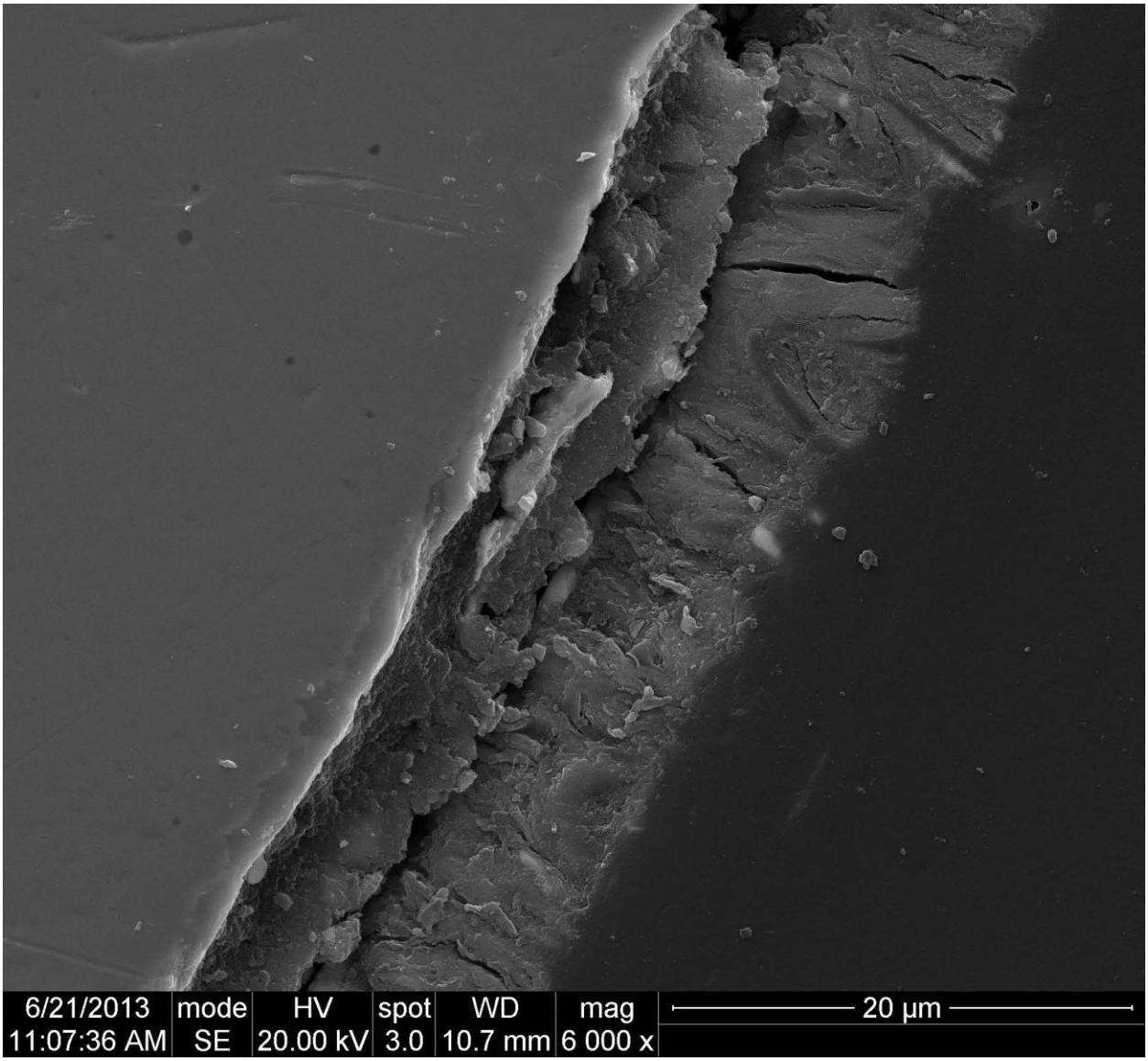
A.10-8: Secondary Electron image of steel saponite interface from EBS 10



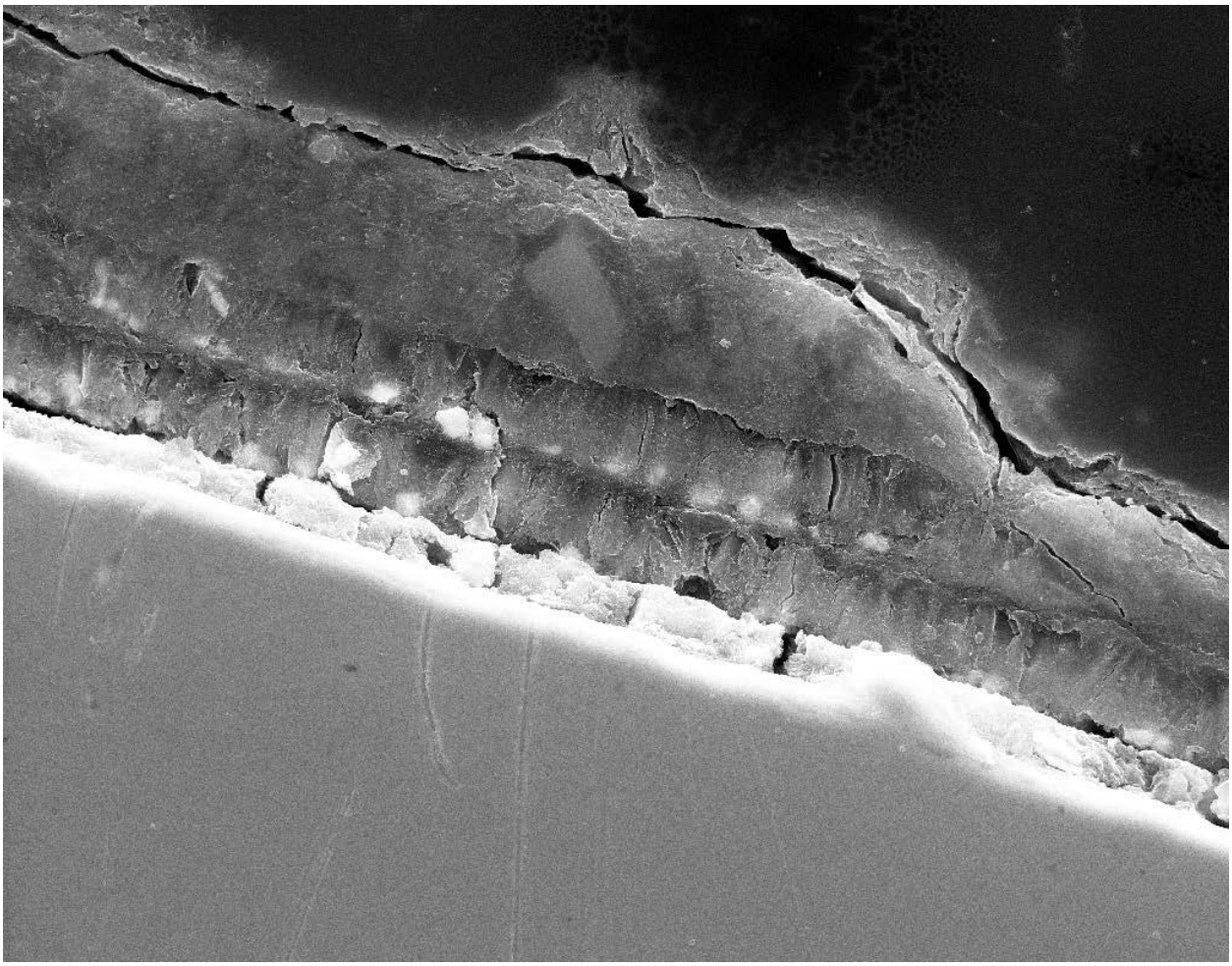
A.10-9: Secondary Electron image of steel saponite interface with chromite from EBS 10



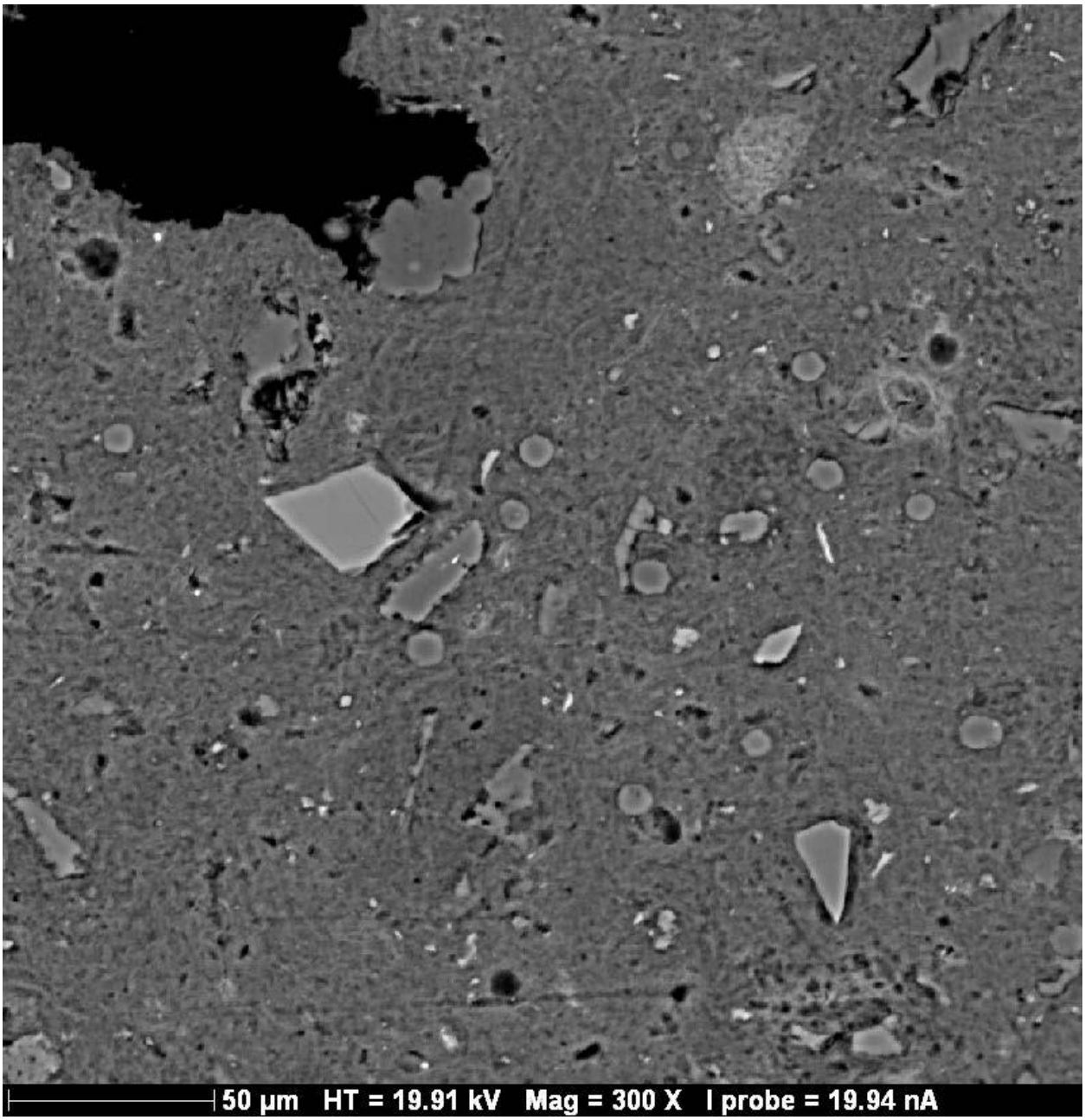
A.10-10: Secondary Electron image of steel saponite interface



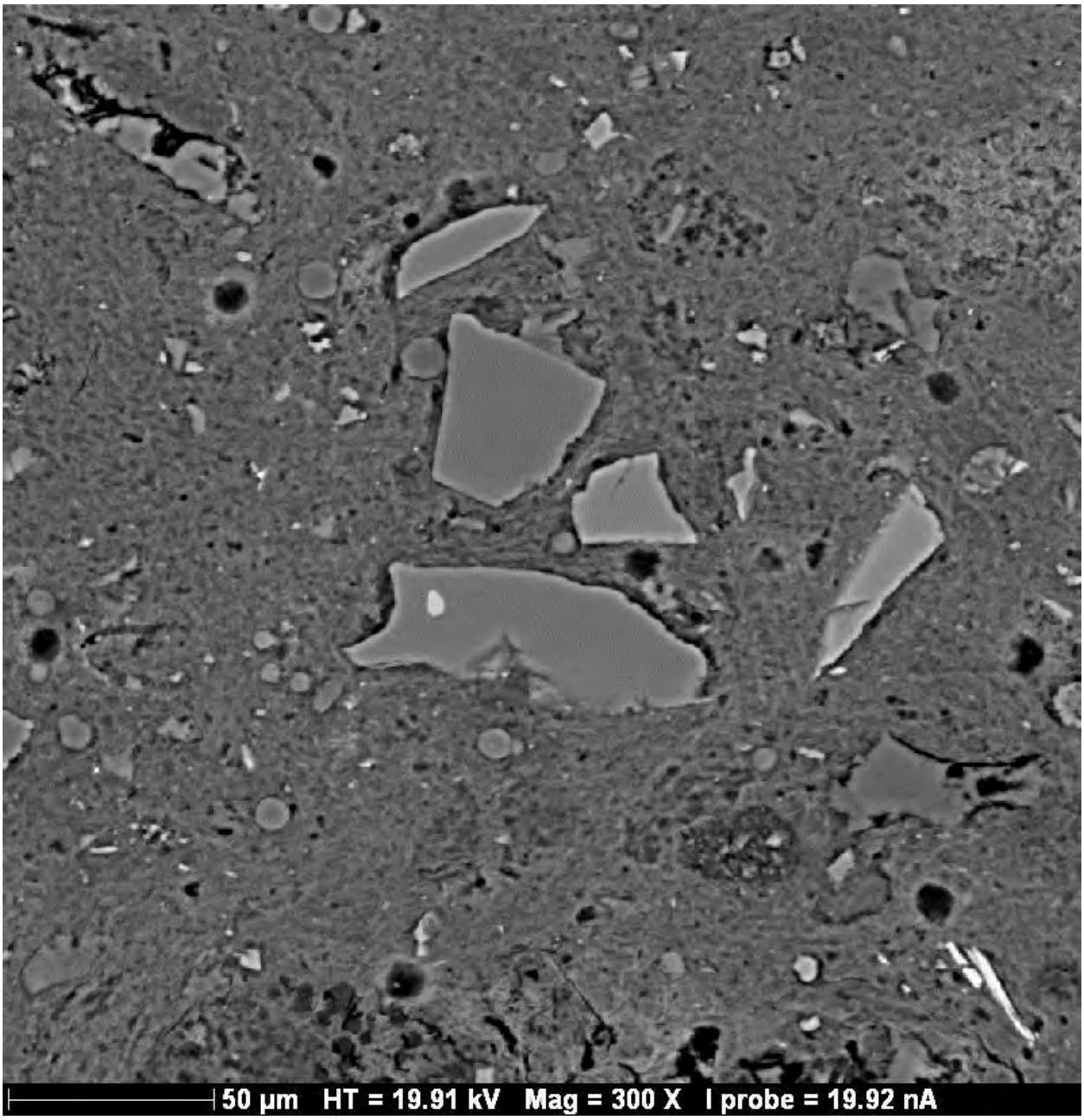
A.10-11: Secondary Electron image of steel saponite interface



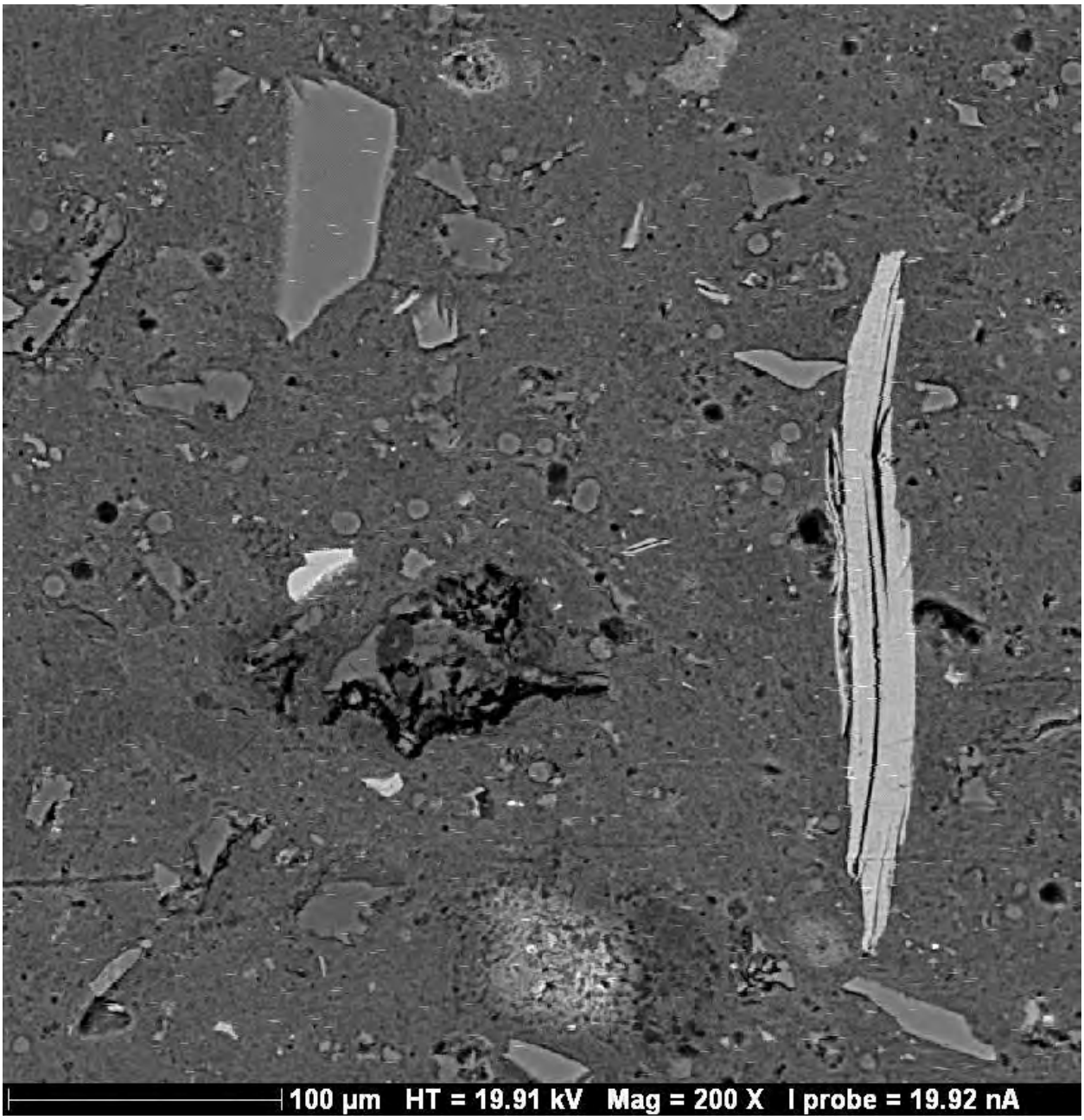
A.10-12: Secondary Electron image of steel saponite multiple interface layers



A.10-13: Back Scattered Electron image of EBS 10 thin section. Note round analcime crystals in matrix



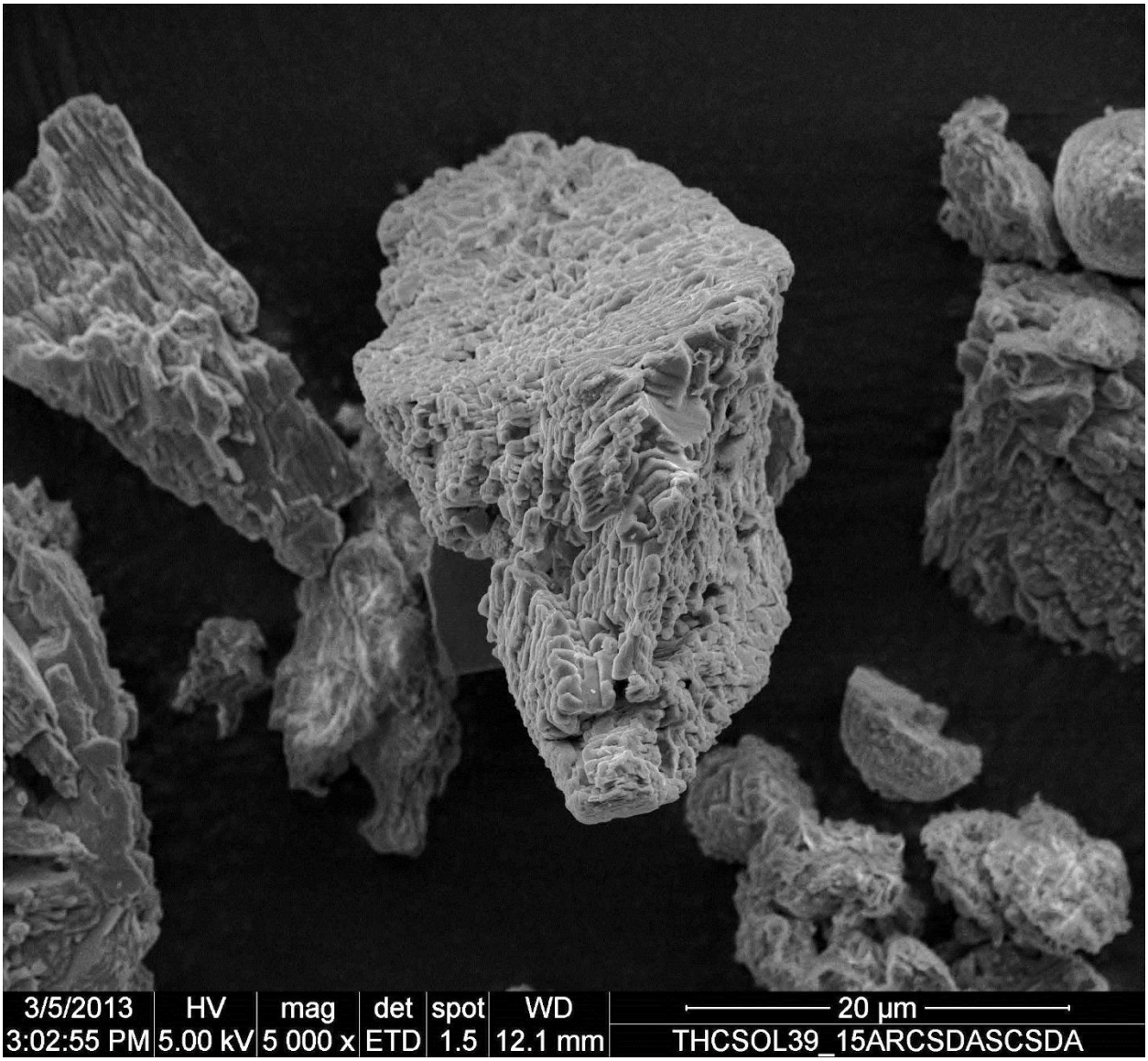
A.10-14: Back Scattered Electron image of EBS 10 thin section. Note round analcime crystals in matrix



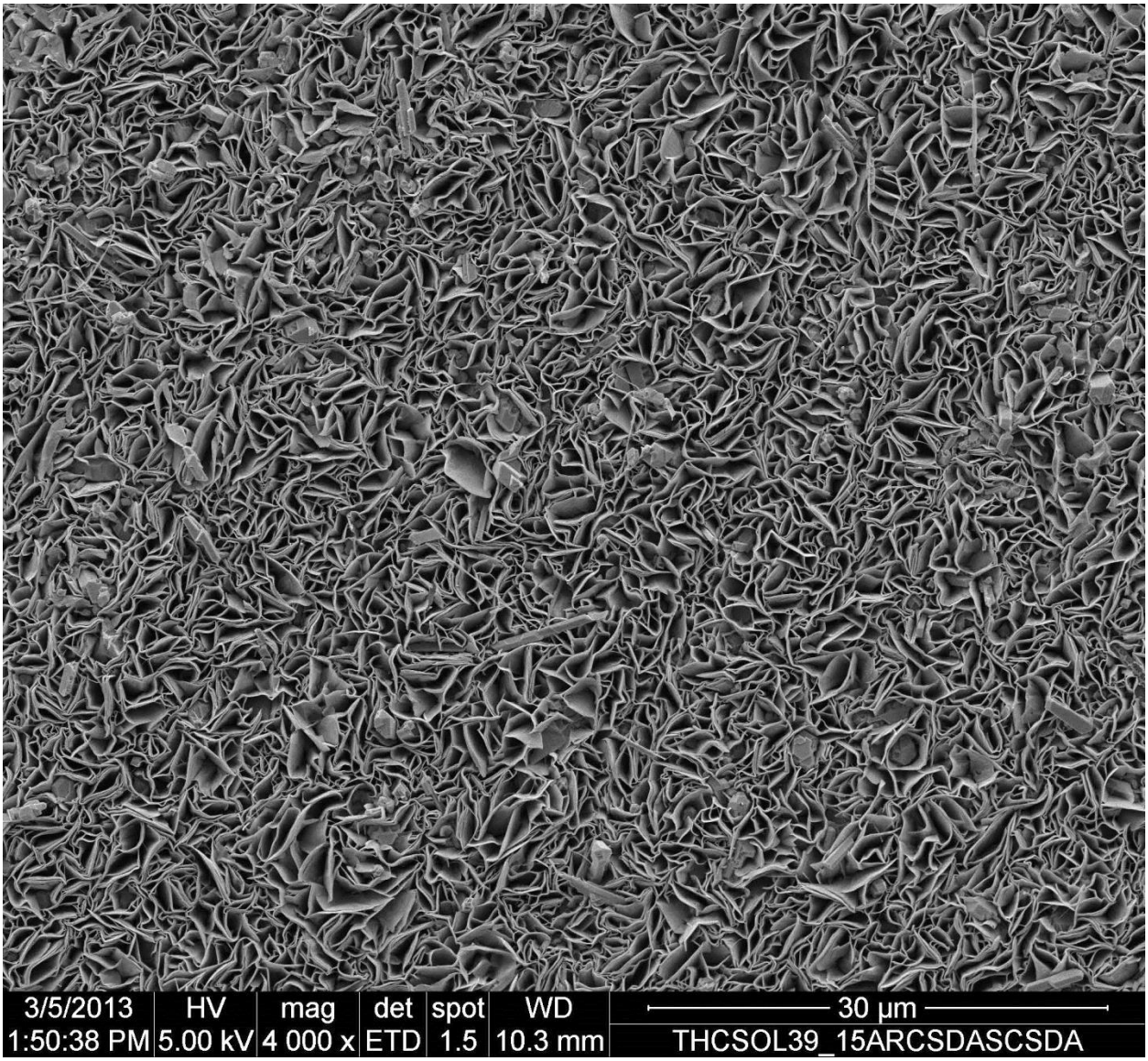
A.10-15: Back Scattered Electron image of EBS 10 thin section. Note round analcime crystals in matrix and light colored biotite phenocryst at right

A.10-16: SEM image of analcime cluster from EBS 10

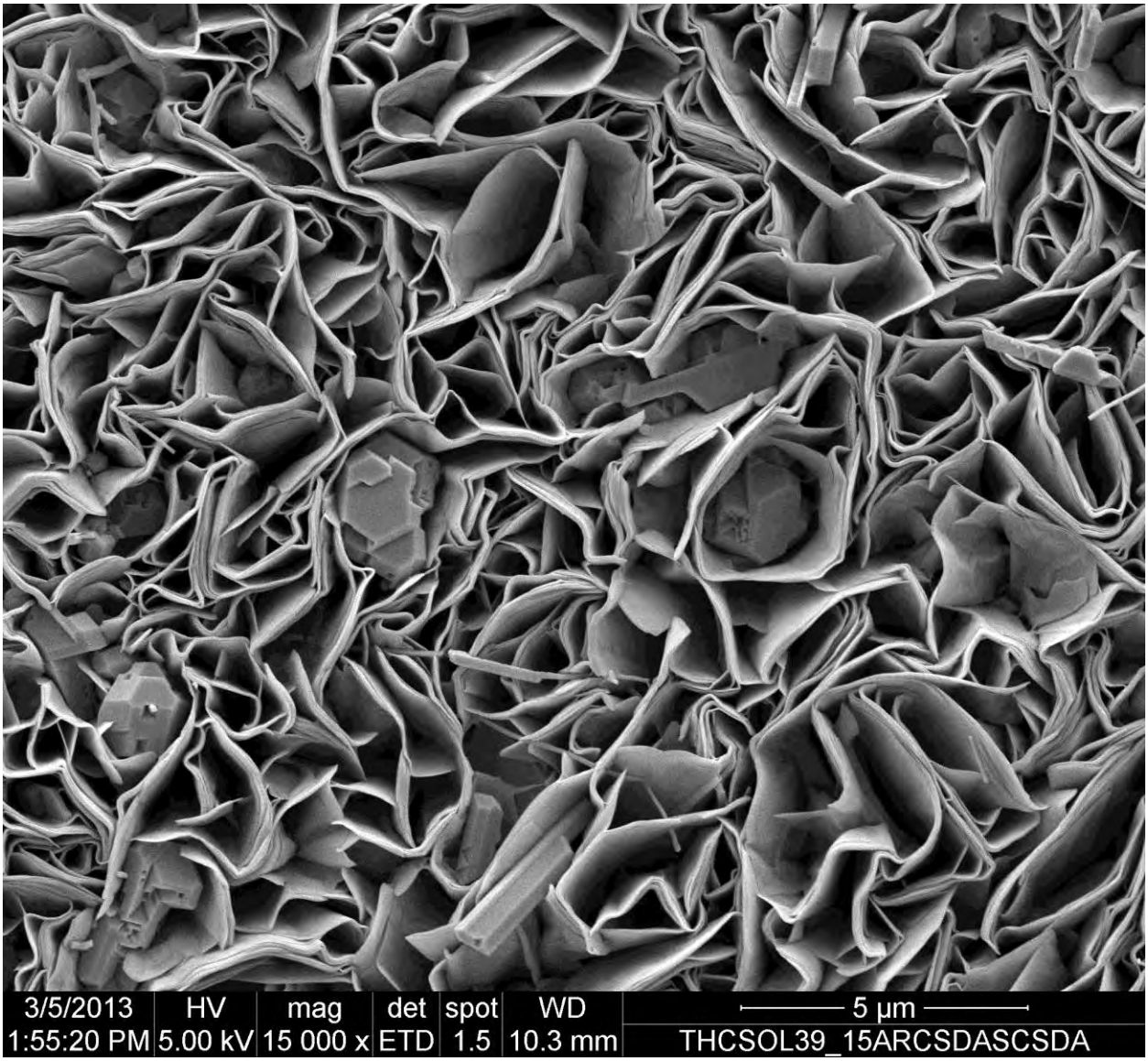
A.10-17: SEM image of analcime clump from EBS 10



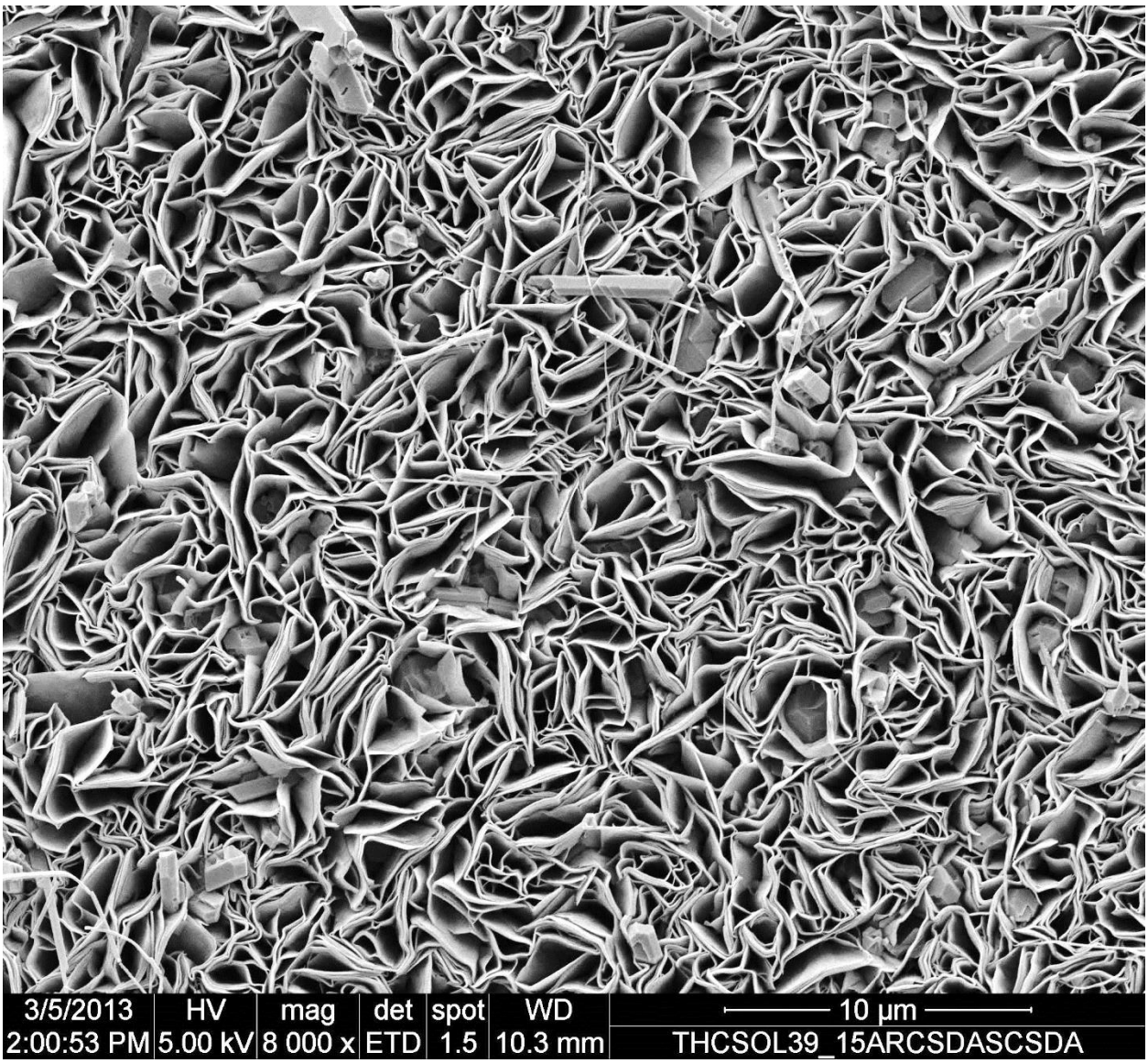
A.10-18: SEM image of corroded clinotpliolite from EBS 10



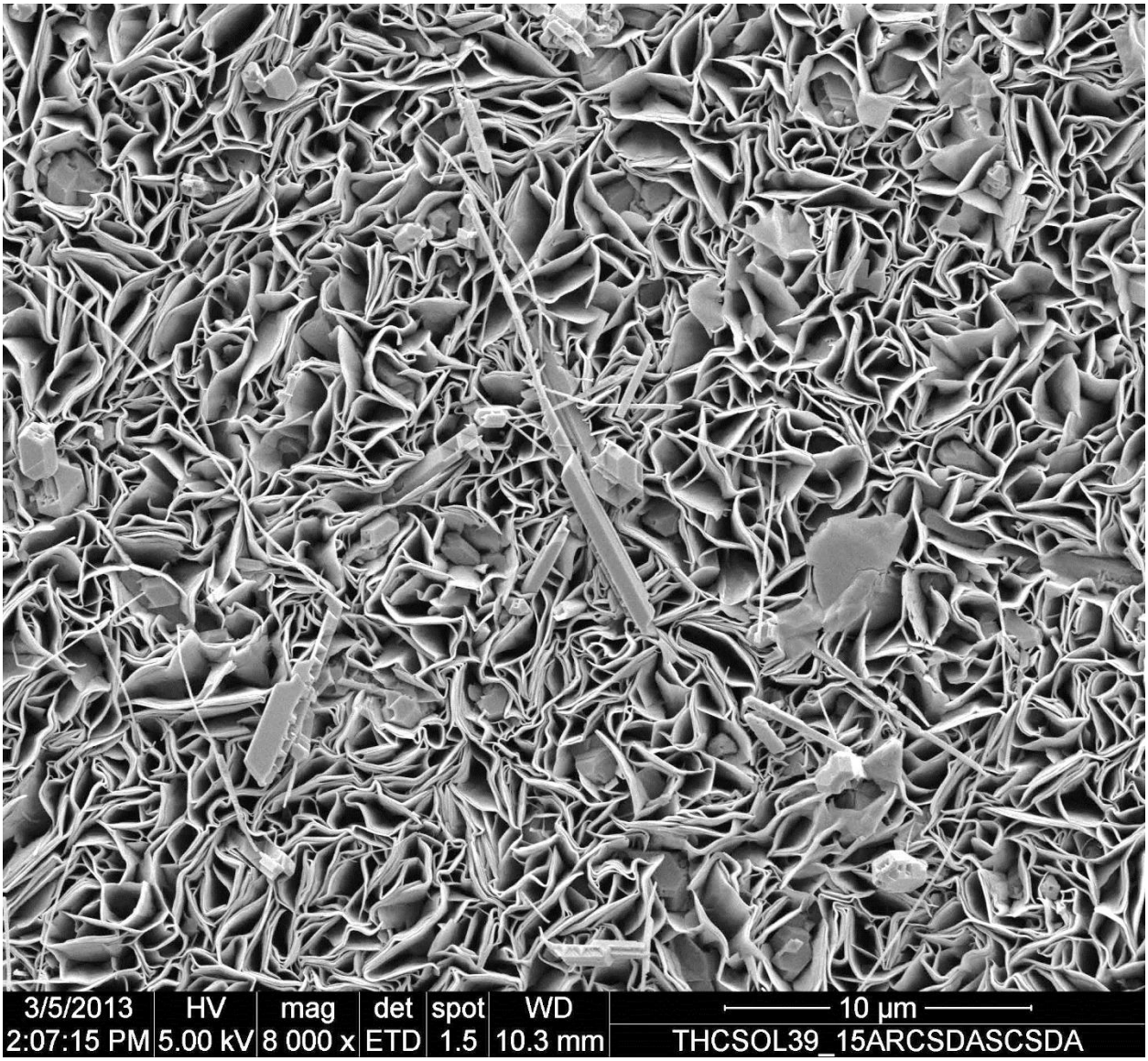
A.10-19: SEM image of iron saponite mat from EBS 10



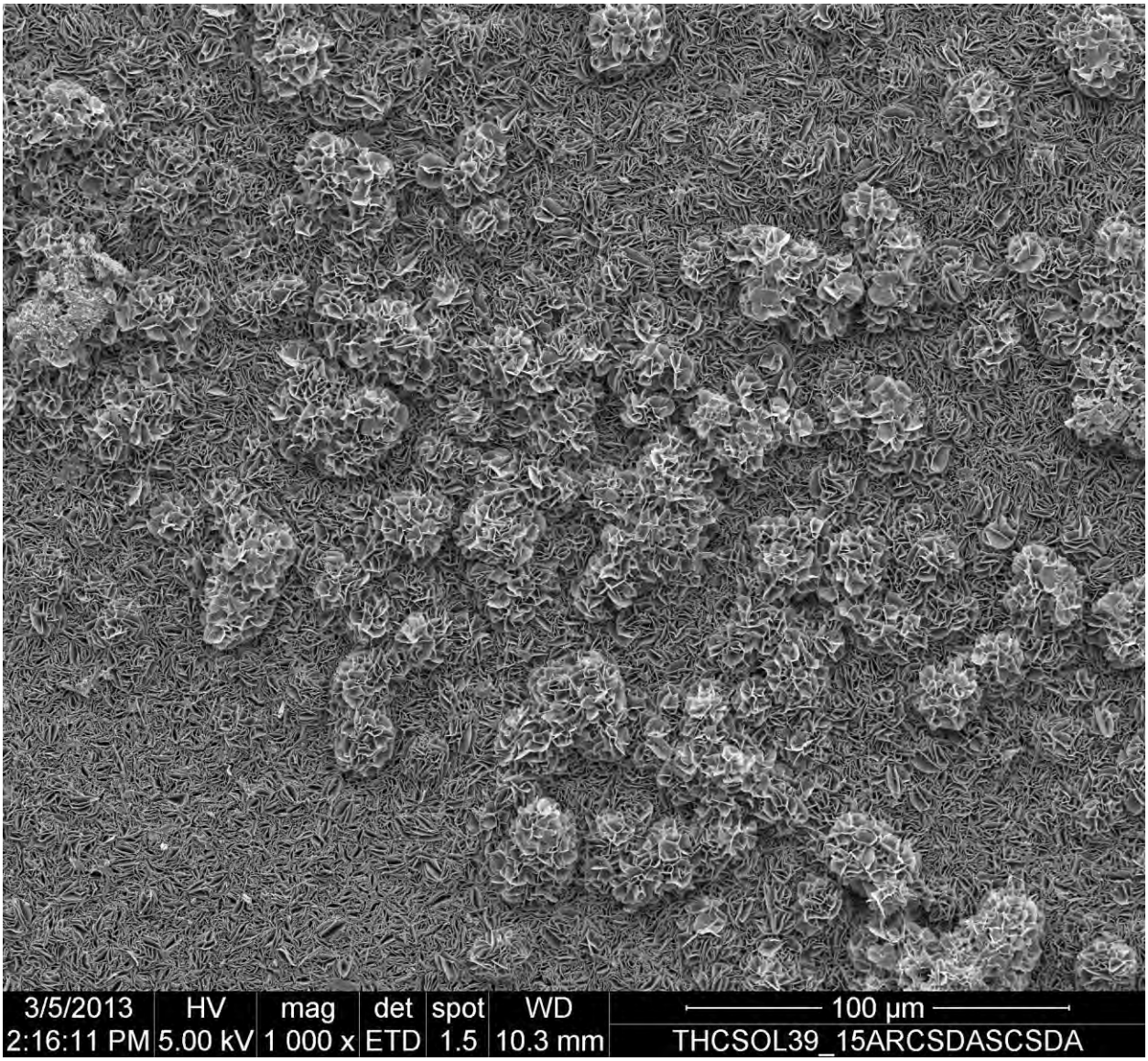
A.10-20: SEM image of iron saponite mat with included pentlandite



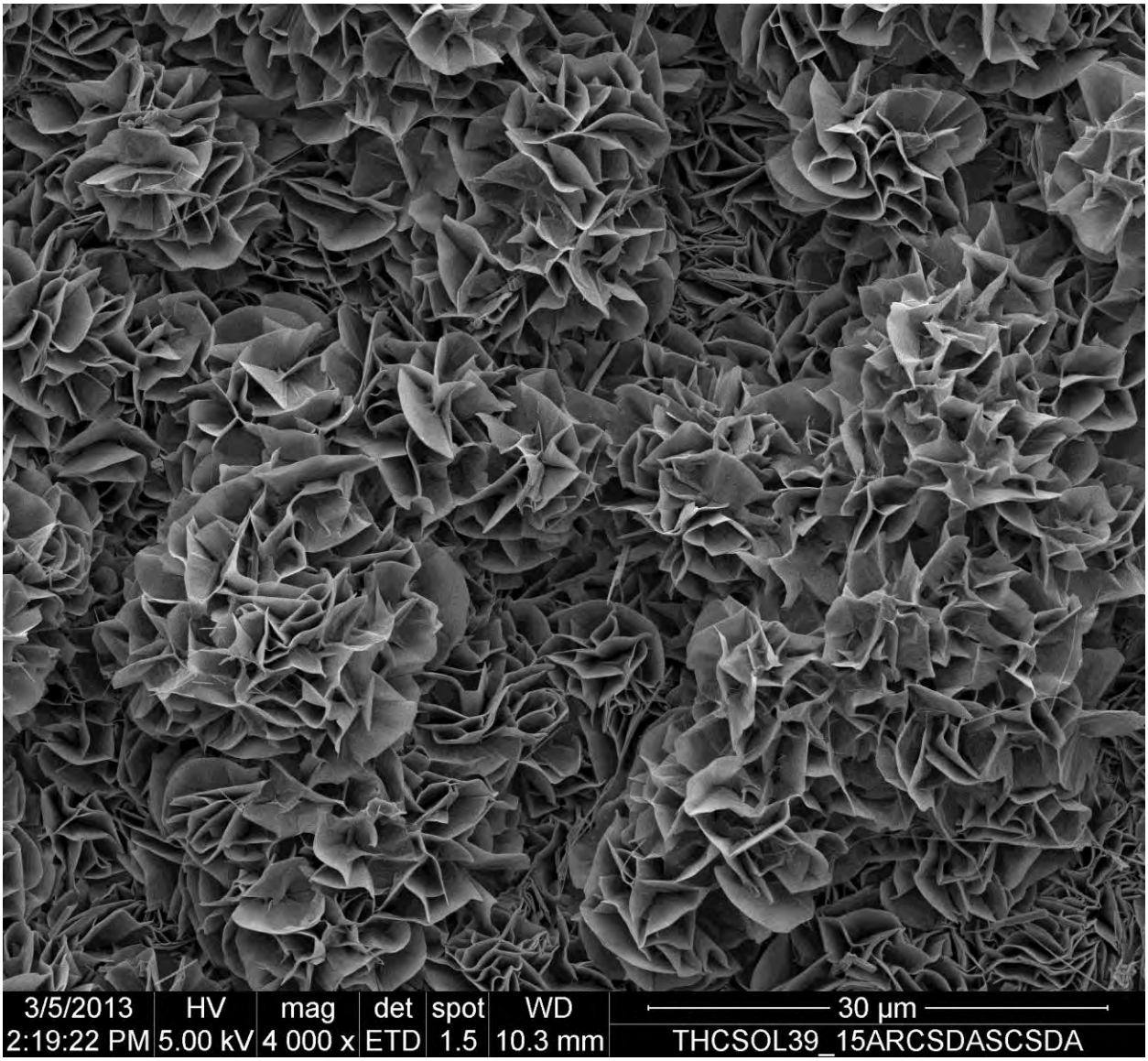
A.10-21: SEM image of iron saponite mat, included pentlandite and with illite(?) or millerite (?) fibers



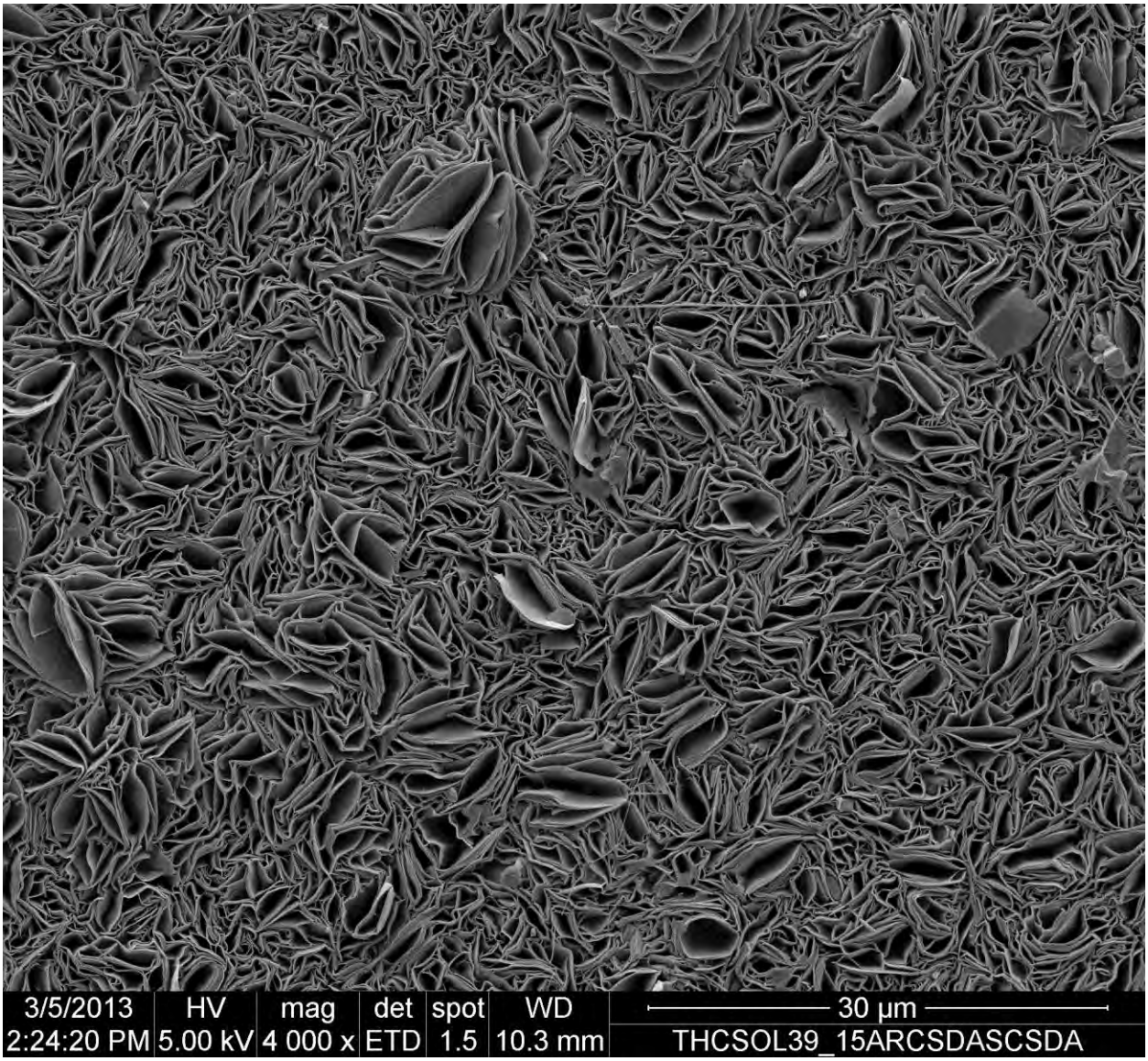
A.10-22: SEM image of Fe-saponite,and spinel law twins pentlandite



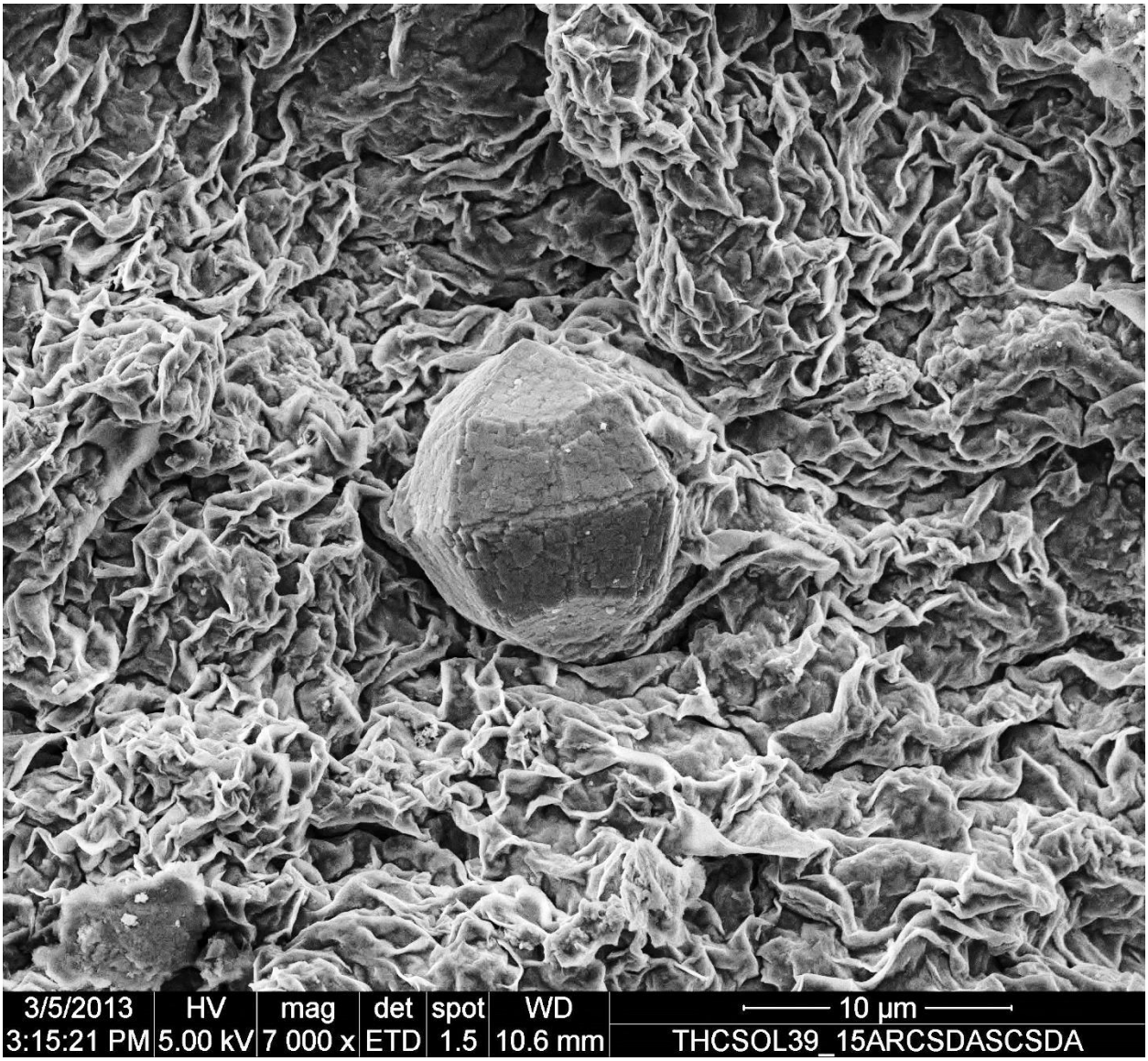
A.10-23: SEM image of Saponite mate with secondary saponite roses



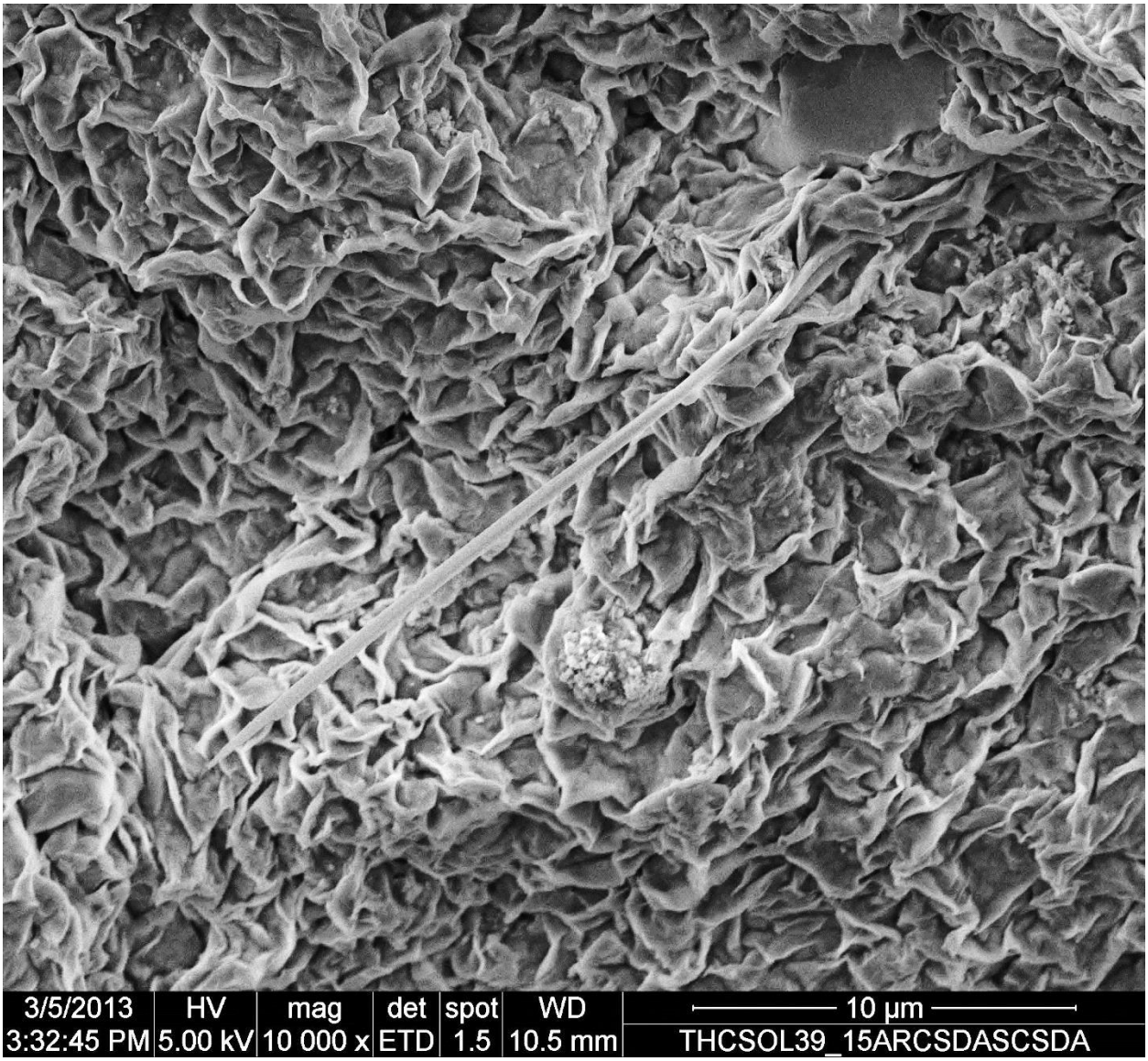
A.10-24: SEM image of Fe-saponite rosettes



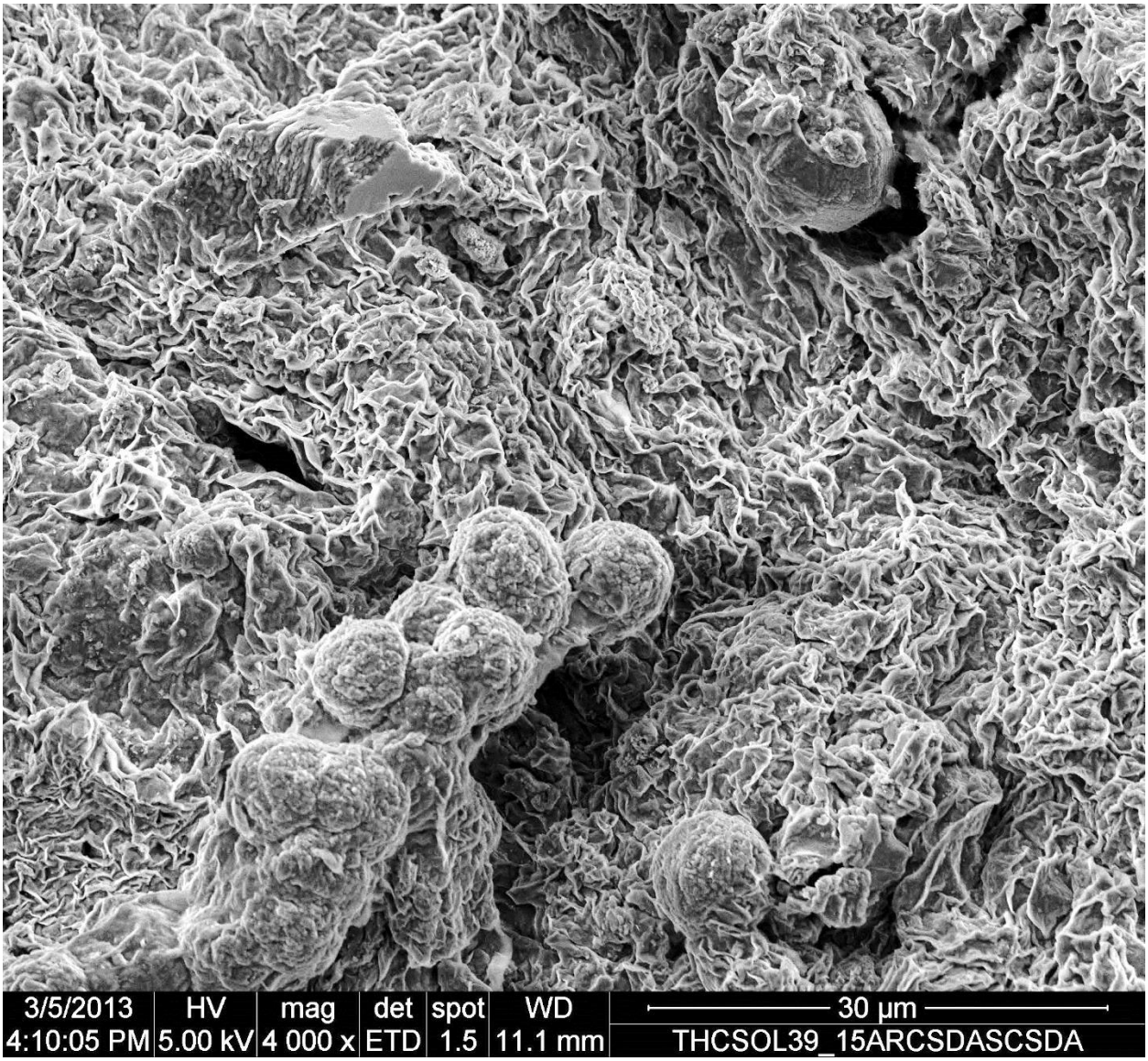
A.10-25: SEM image of Fe-saponite secondary growth structures



A.10-26: SEM image of analcime in smectite matrix



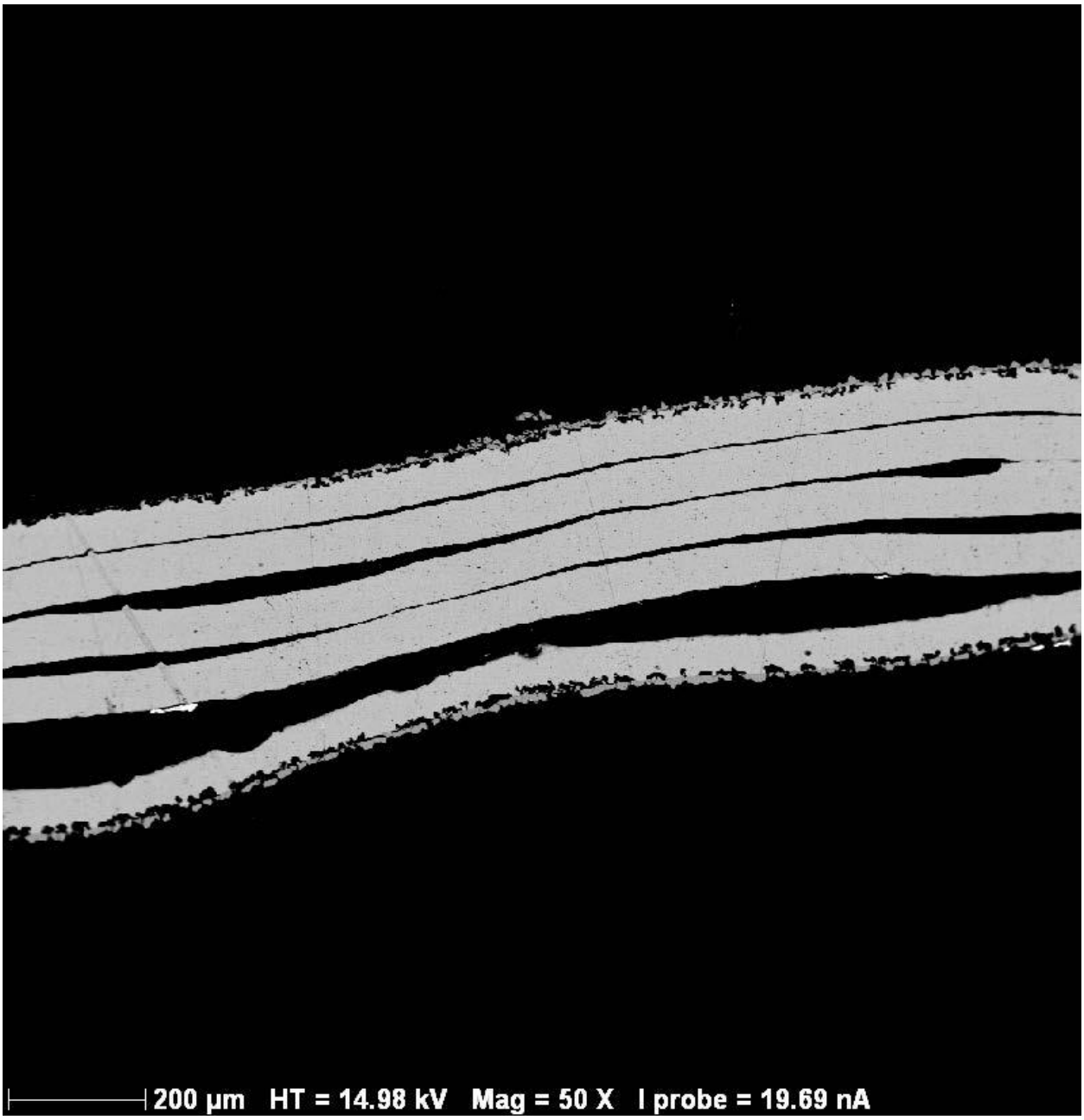
A.10-27: SEM image of illite (?) on smectite from EBS 10



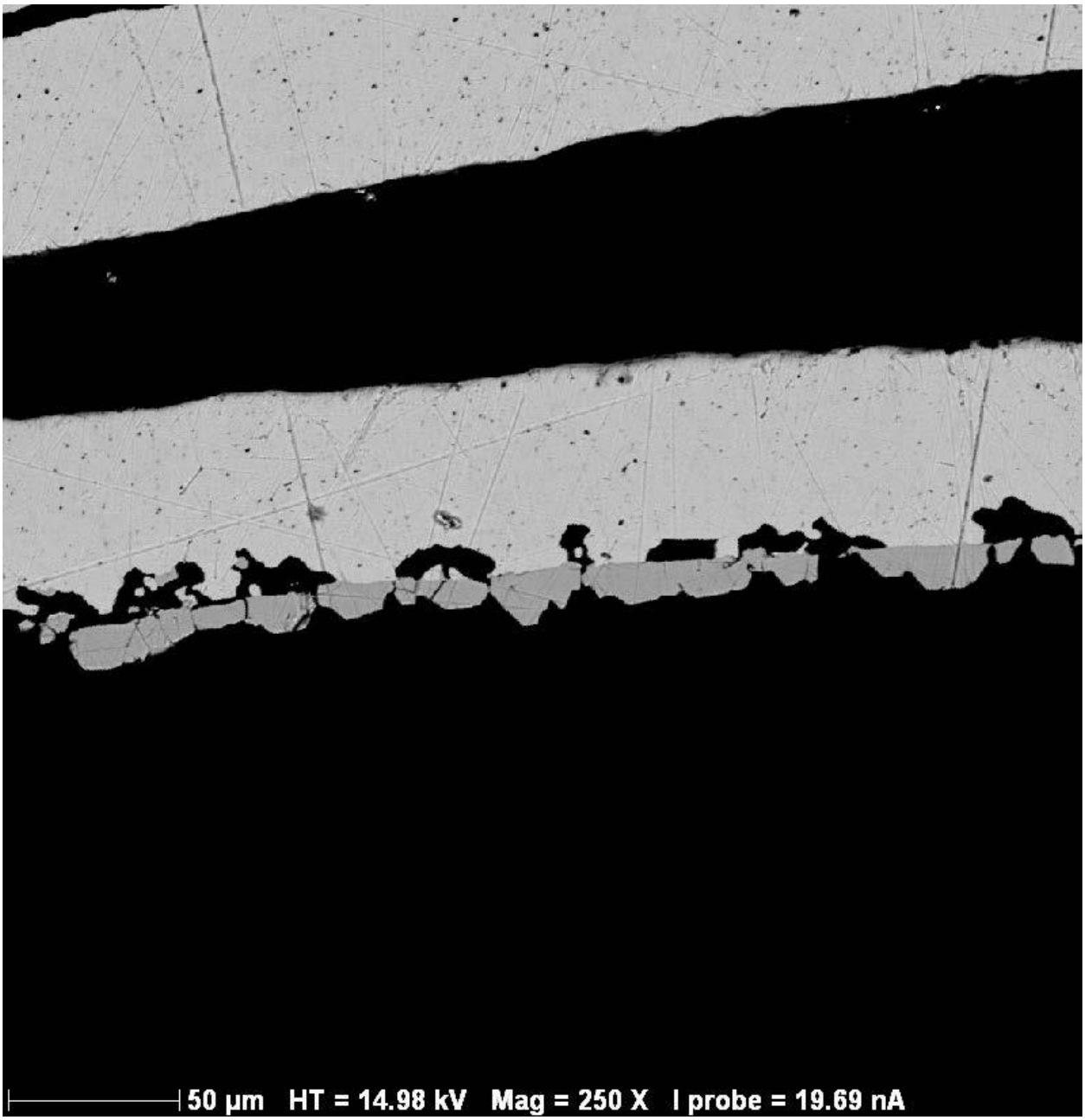
A.10-28: SEM image of analcime cluster after lapilli from EBS 10

Appendix A.11

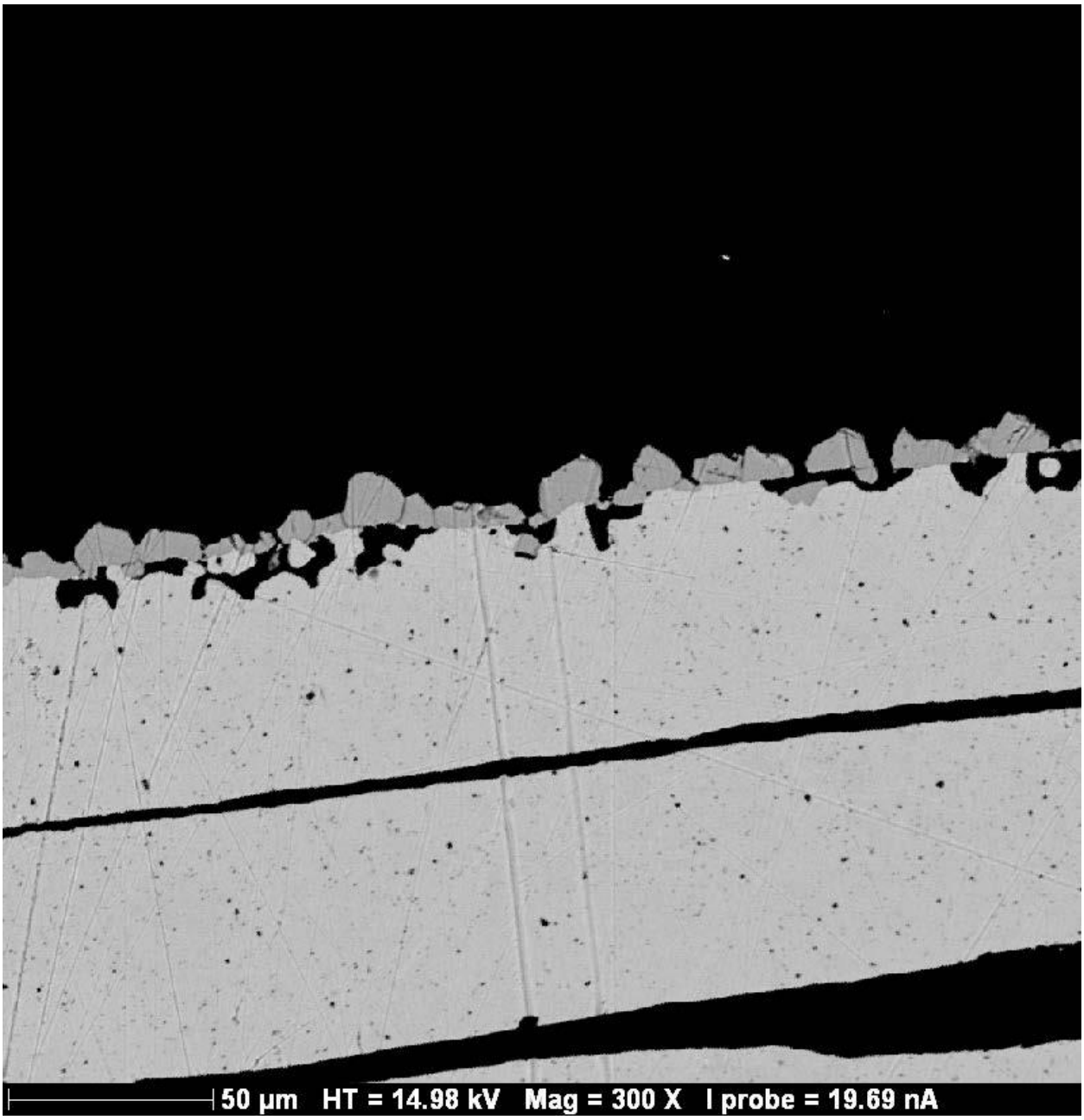
EBS-11 Isothermal at 300°C and 150 bar for 6 weeks run with copper



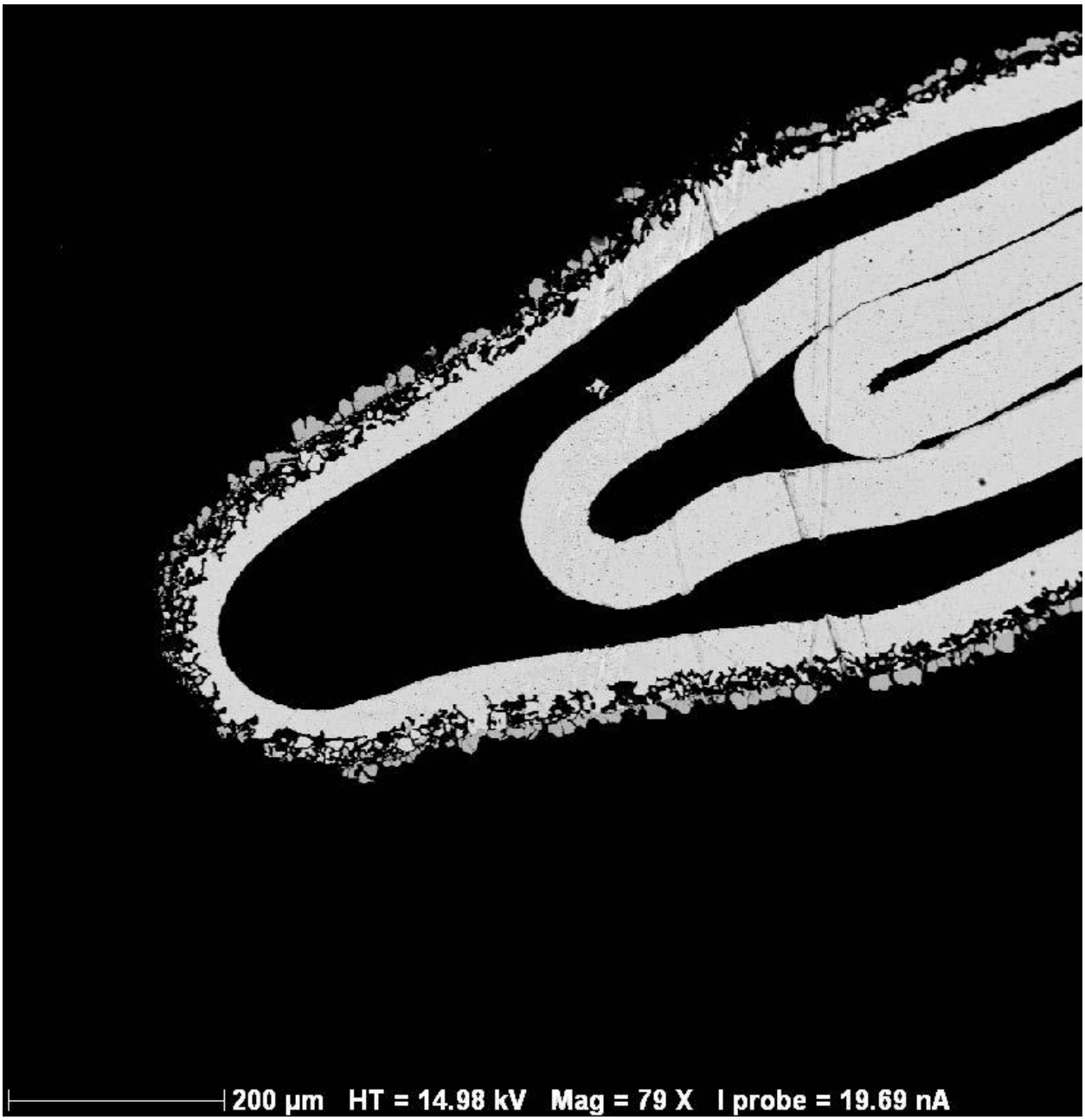
A.11-1 Backscattered Electron image of copper corrosion from EBS 11



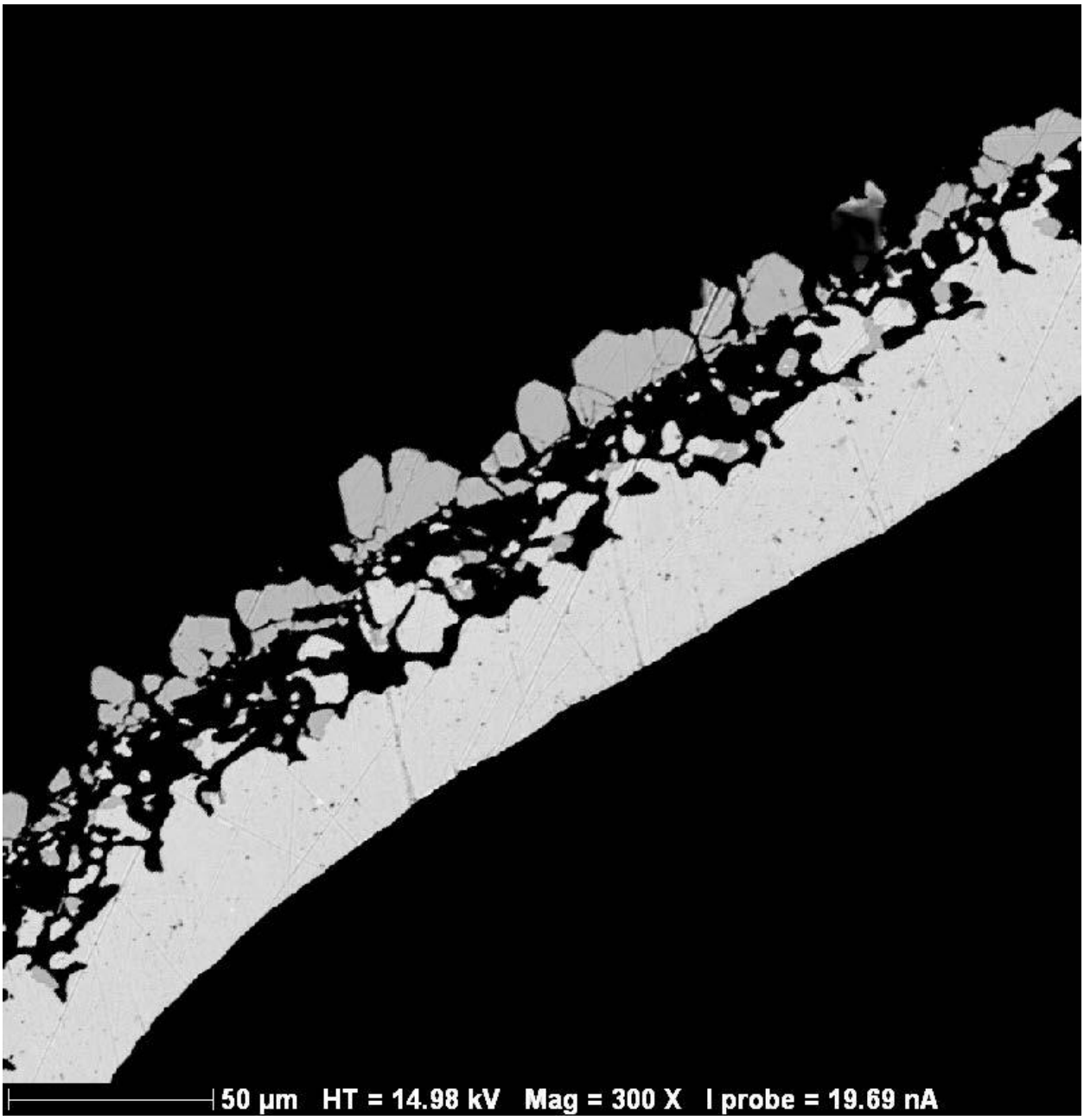
A.11-2 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition.



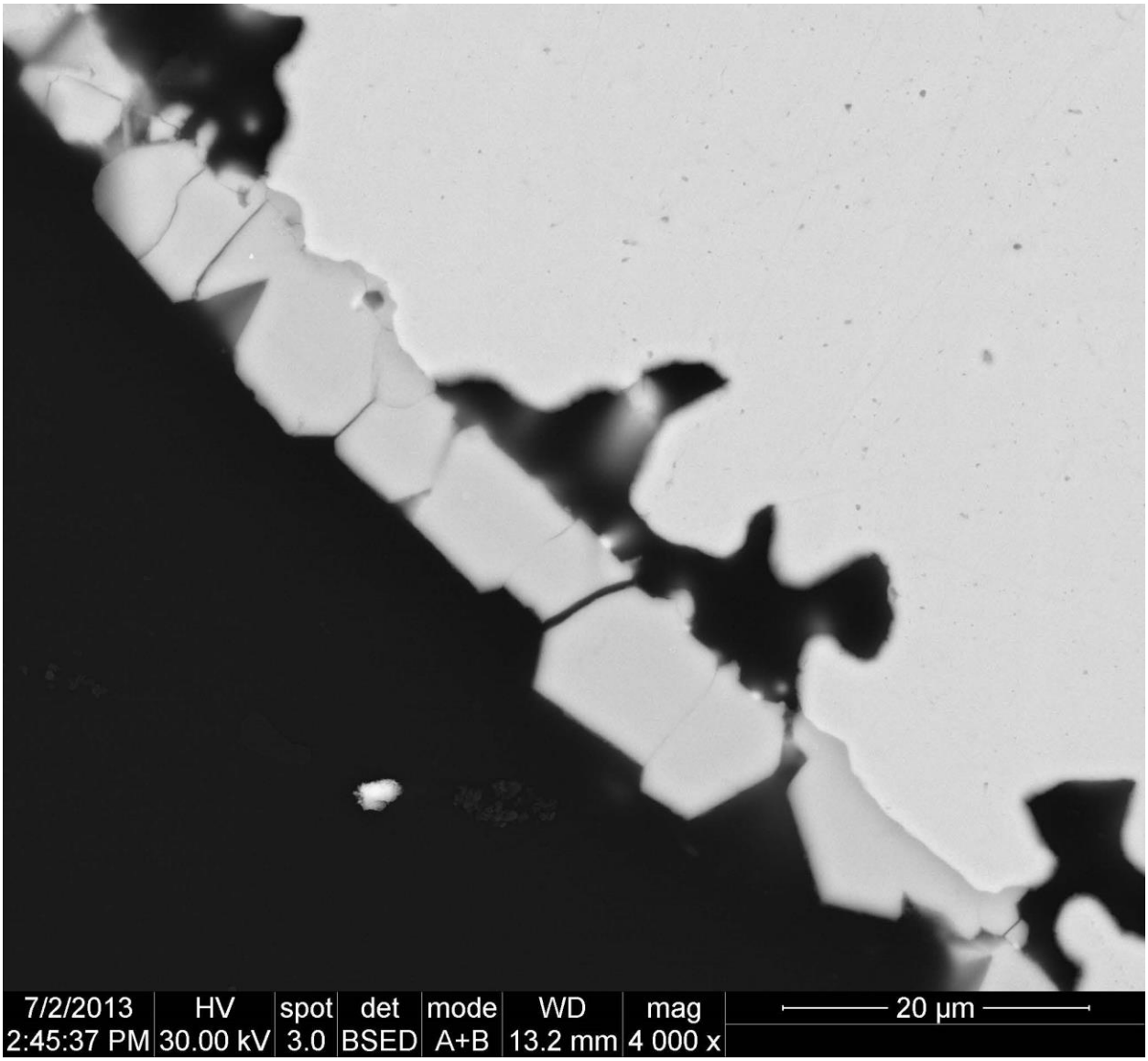
A.11-3 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition.



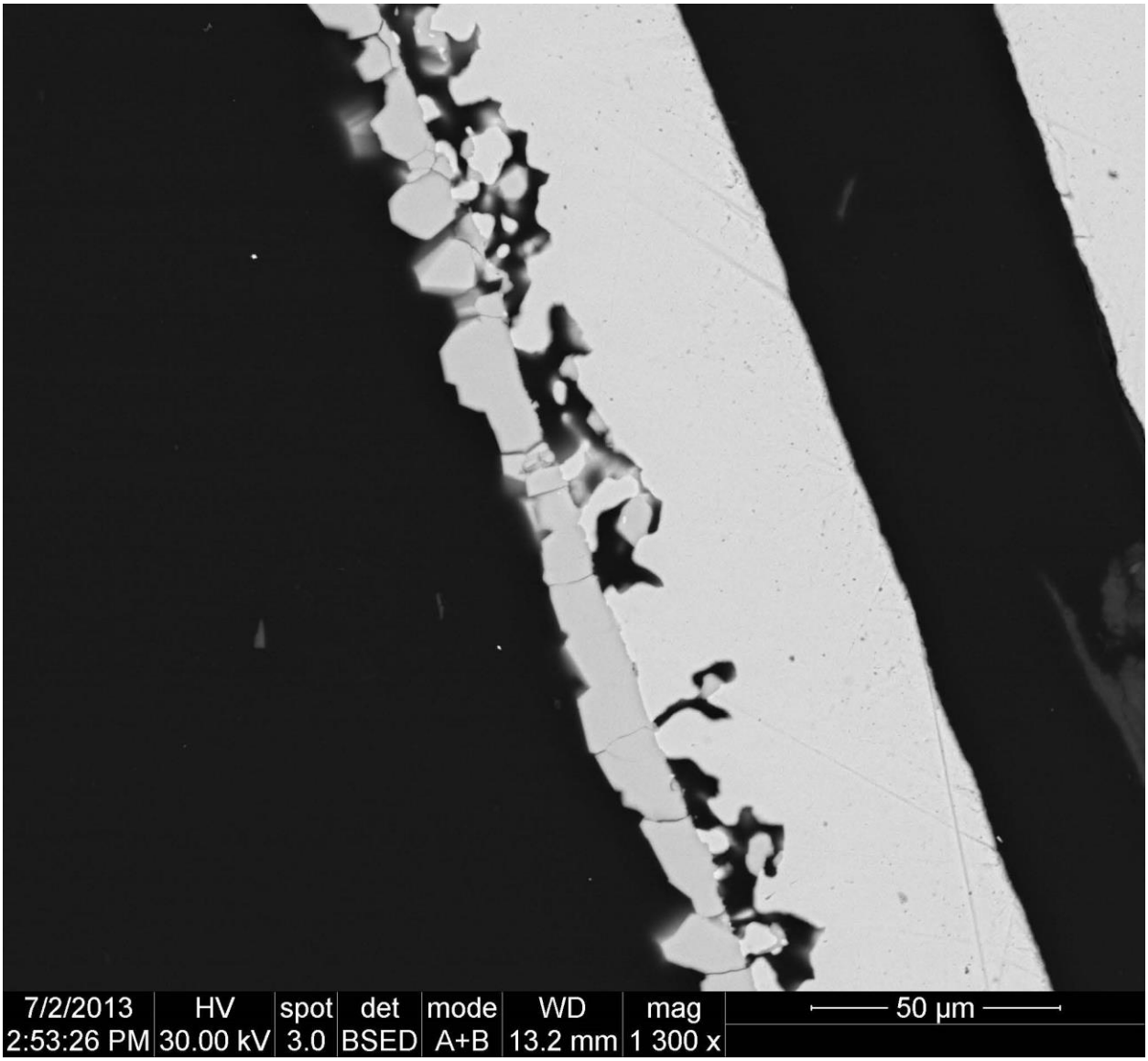
A.11-4 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition andextreme depth of pit corrosionaround bend



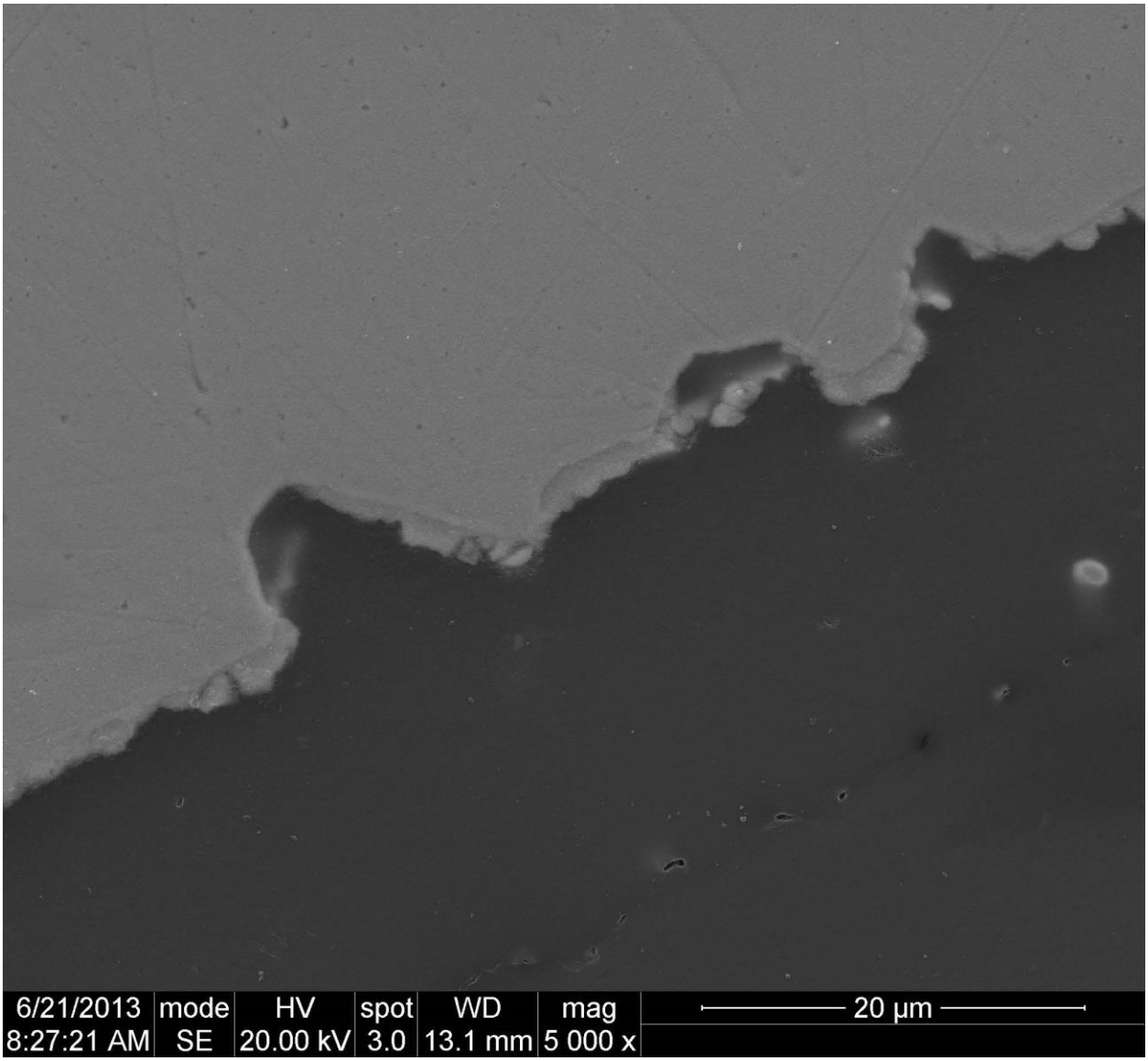
A.11-5 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition.



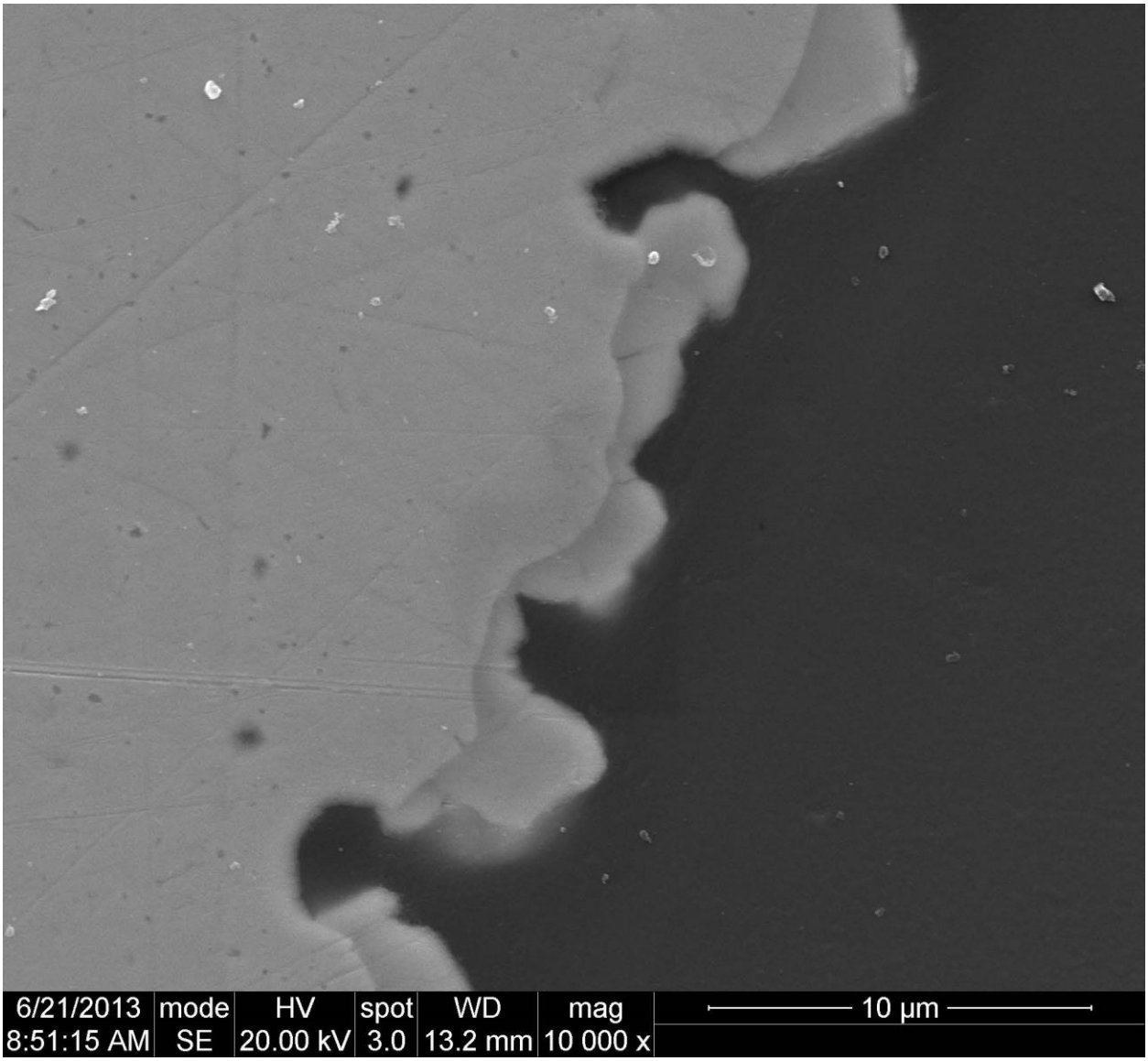
A.11-6 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition. Chalcocite layer nearly complete.



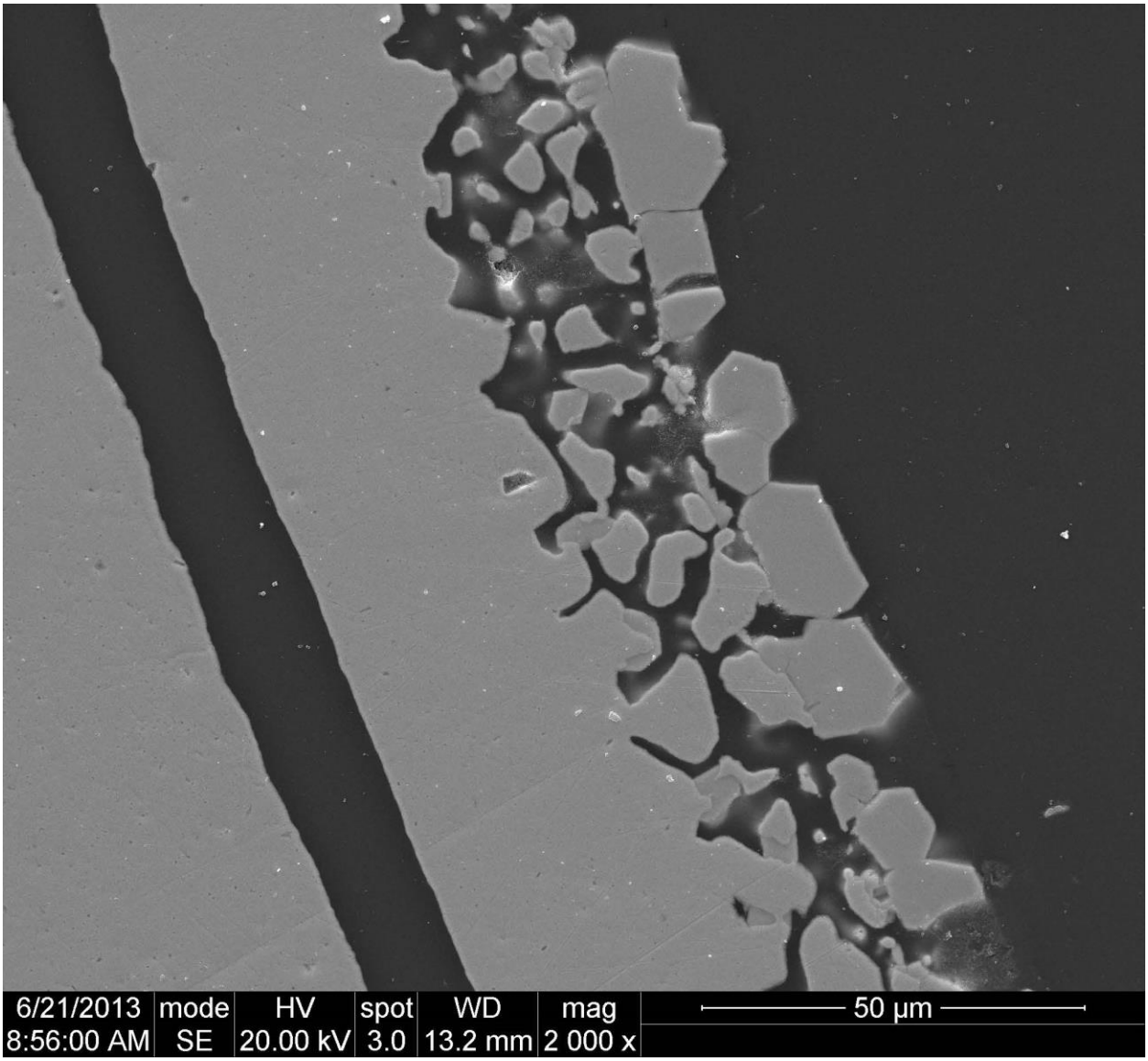
A.11-7 Backscattered Electron image of copper corrosion. Note pit corrosion and overlying chalcocite deposition. Chalcocite layer nearly complete



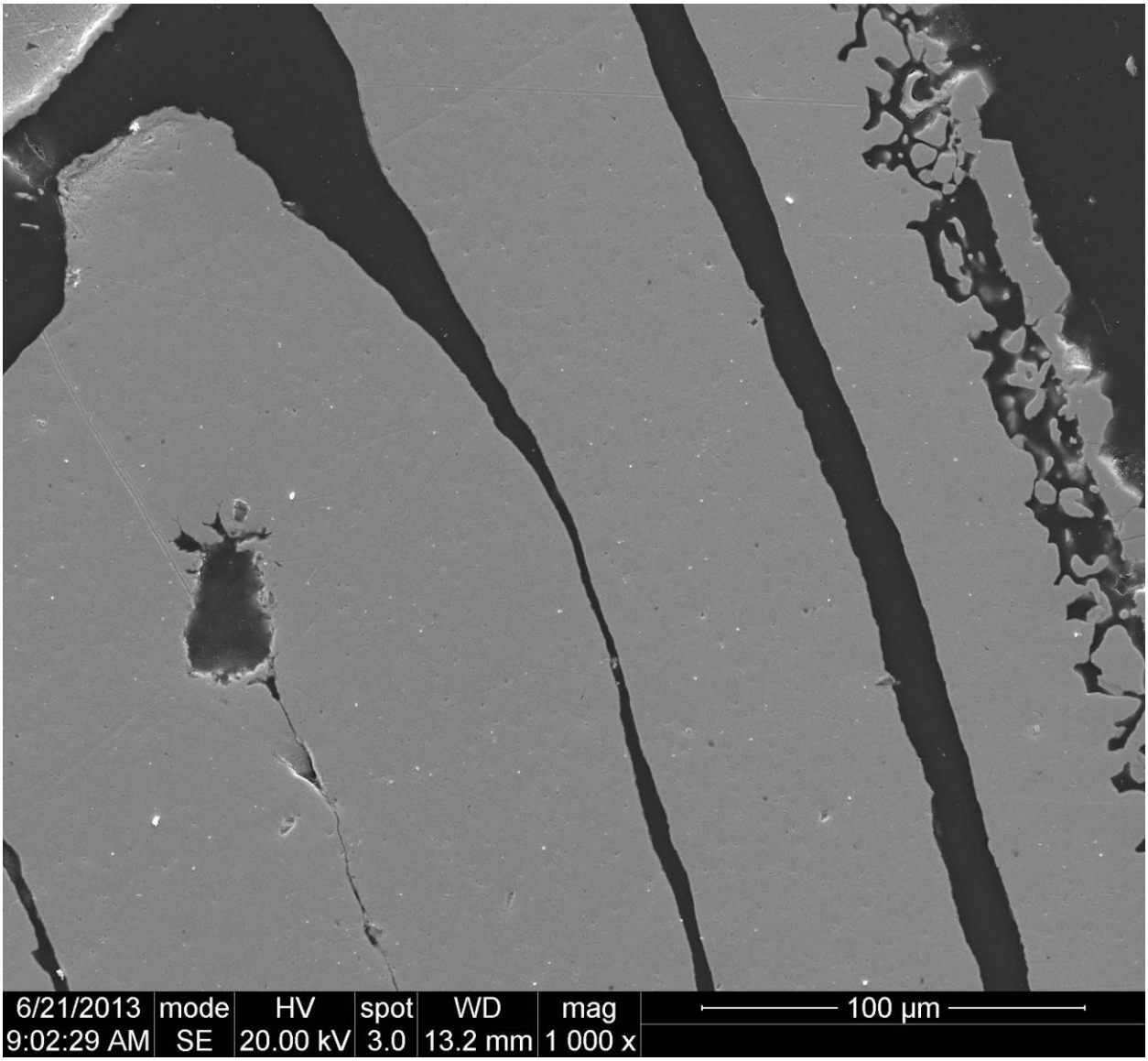
A.11-8 Secondary Electron image of copper corrosion. Note pit corrosion and chalcocite deposition within pit



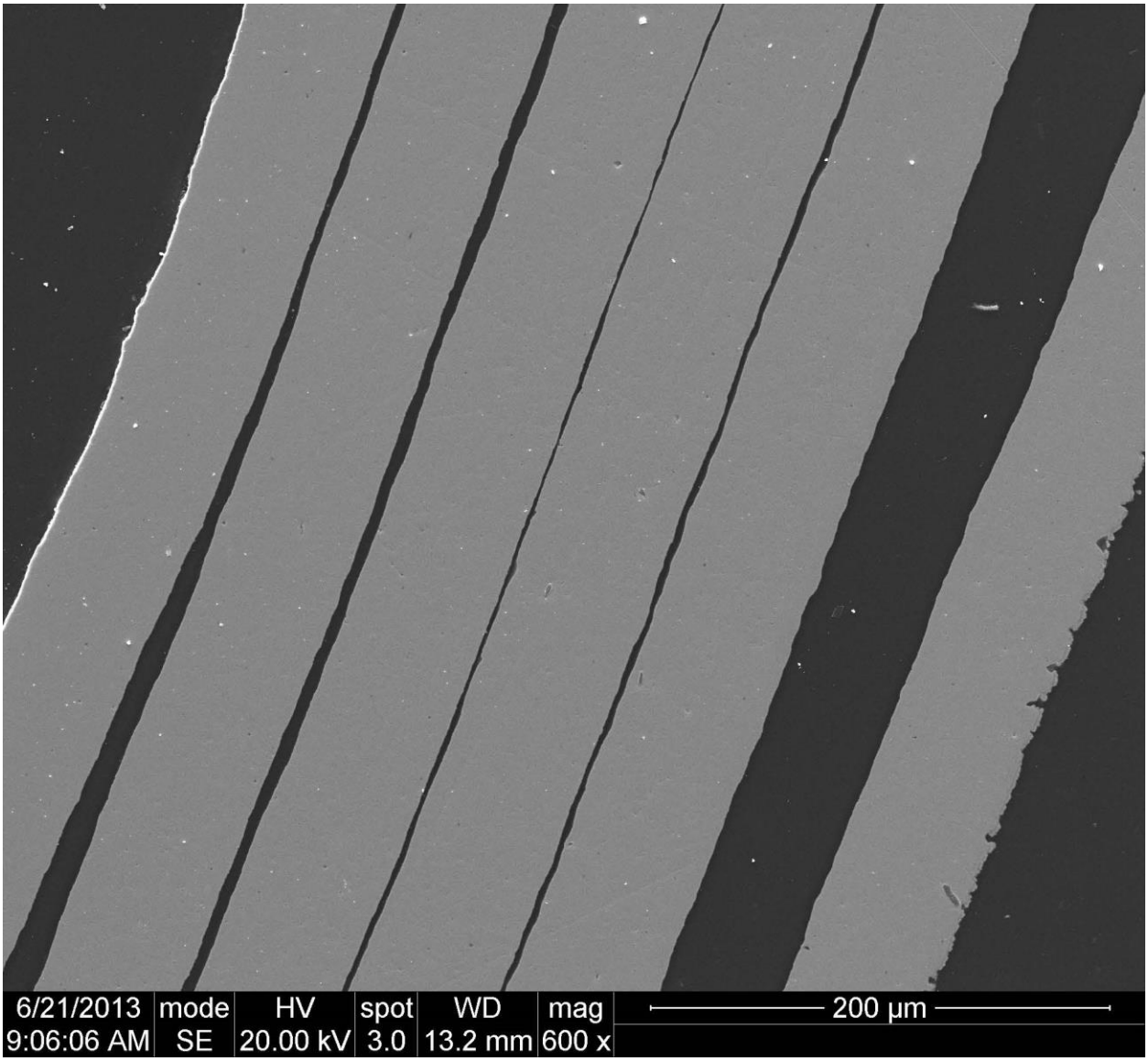
A.11-9 Secondary Electron image of copper corrosion. Note pit corrosion and chalcocite deposition



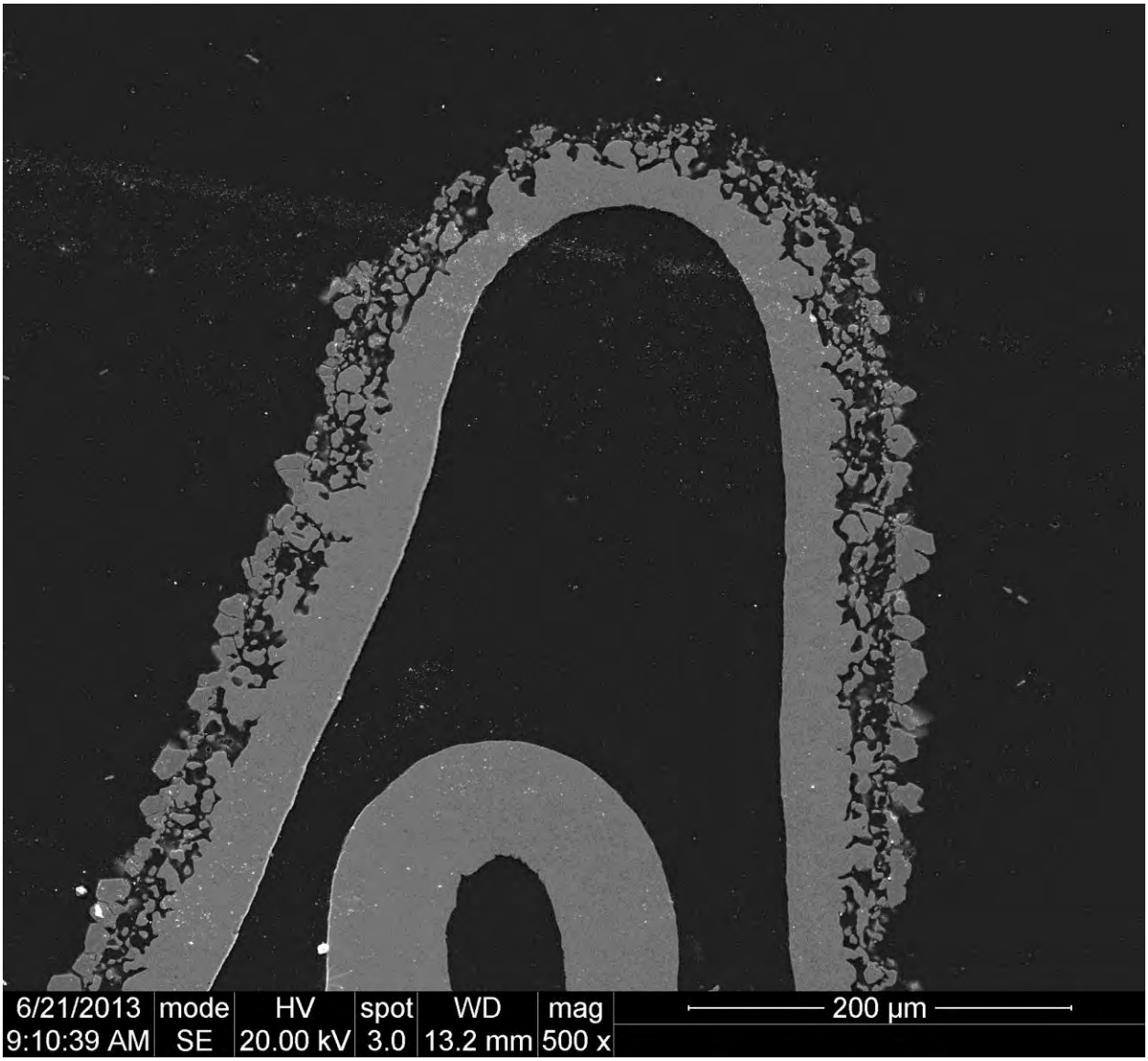
A.11-10 Secondary Electron image of copper corrosion. Note extensive pit corrosion and overlying chalcocite deposition



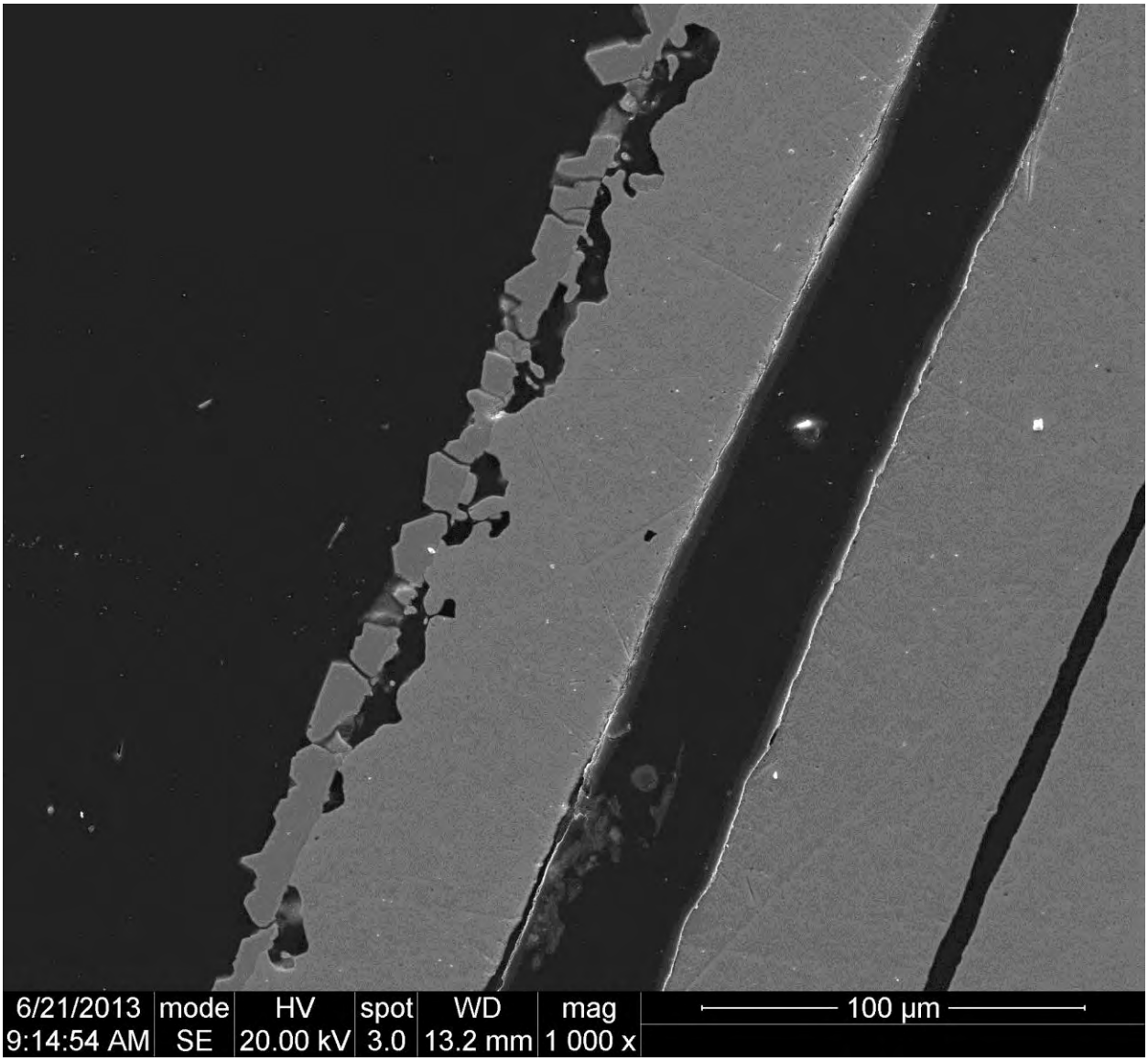
A.11-11 Secondary Electron image of copper corrosion. Note extensive pit corrosion at right. Other surfaces unaltered due to shielding from fluids



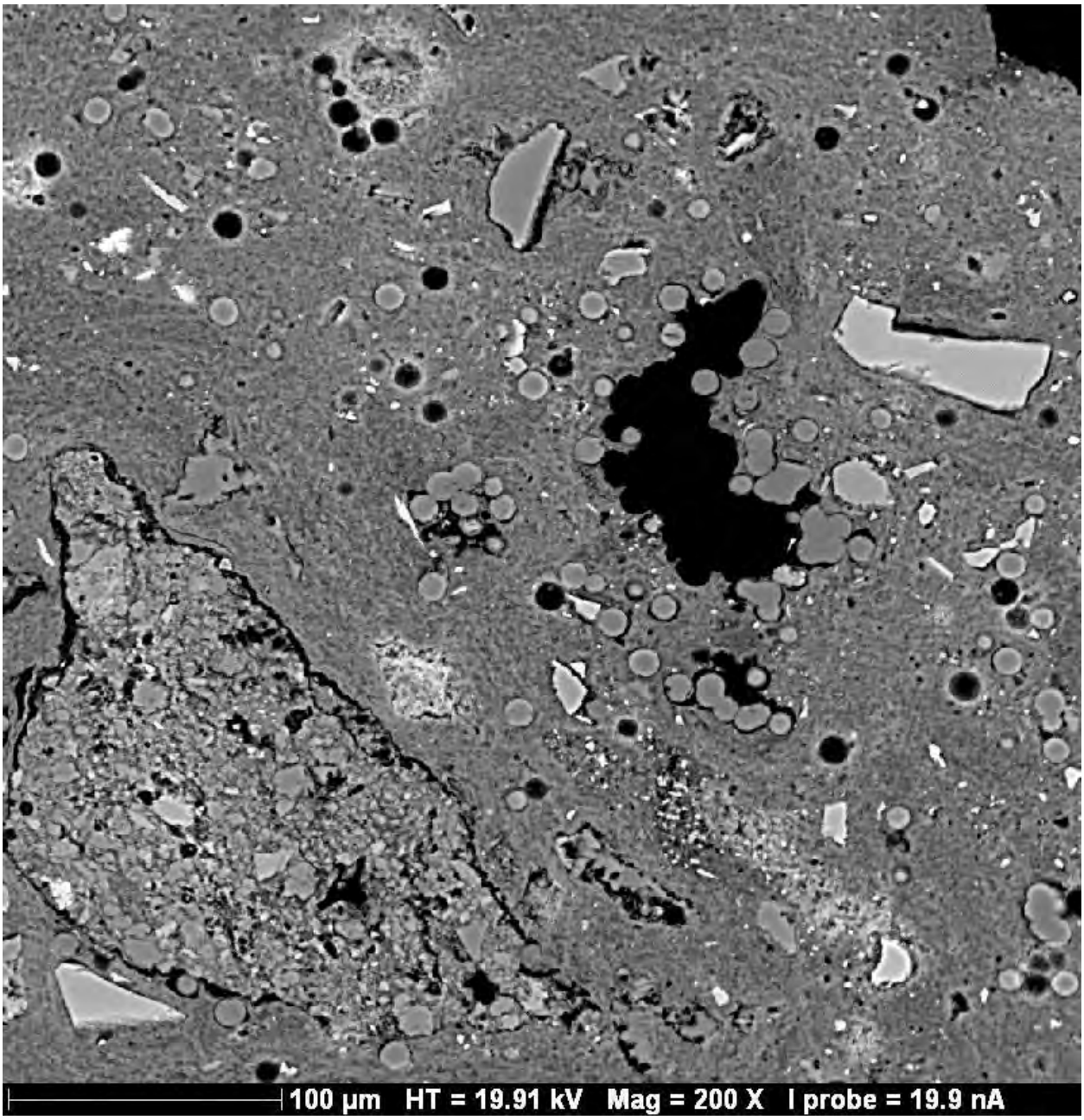
A.11-12 Secondary Electron image of copper corrosion. Note minor pit corrosion at right. Other surfaces unaltered due to shielding from fluids



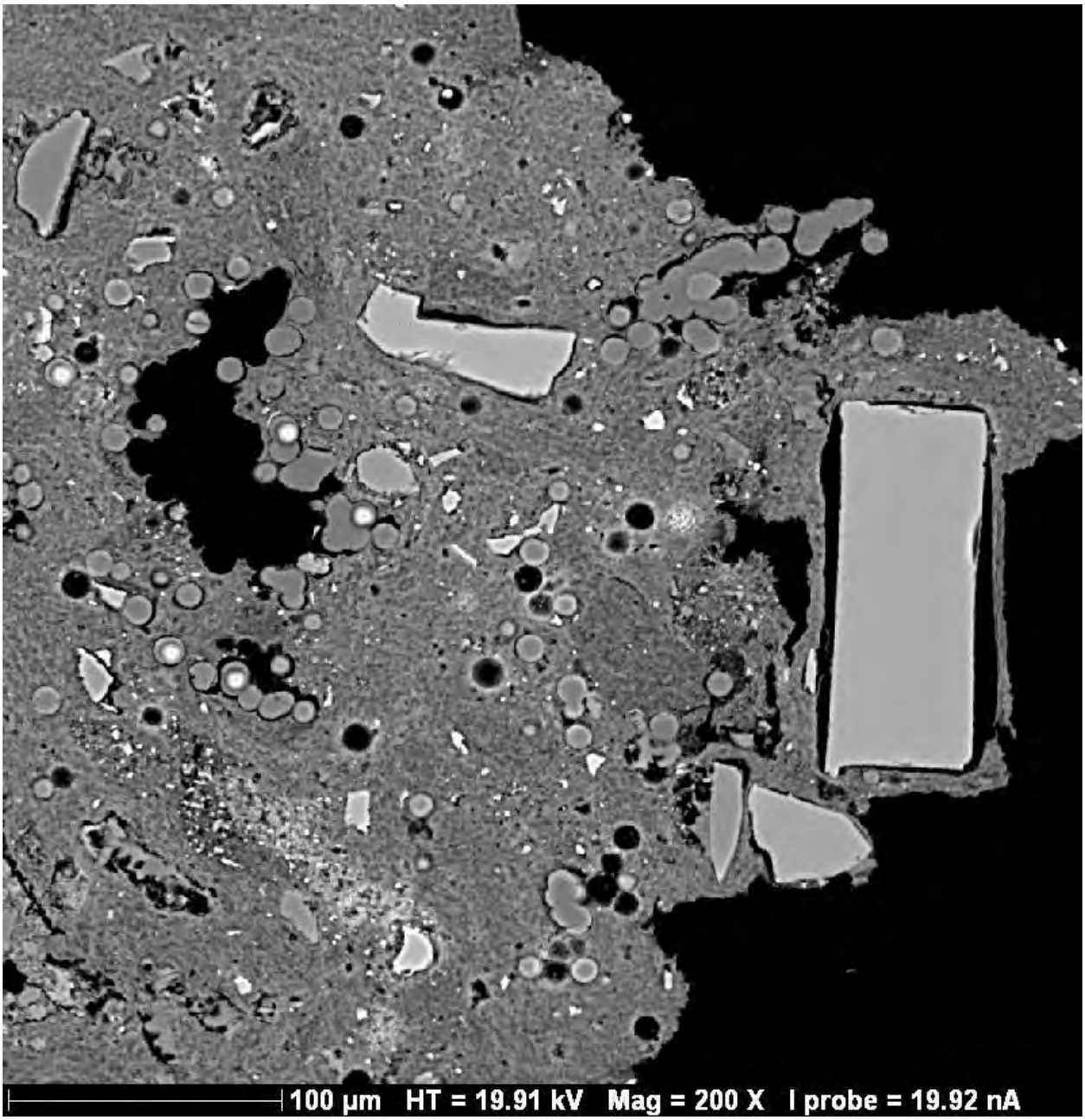
A.11-13 Secondary Electron image of copper corrosion. Note extensive pit corrosion at bend



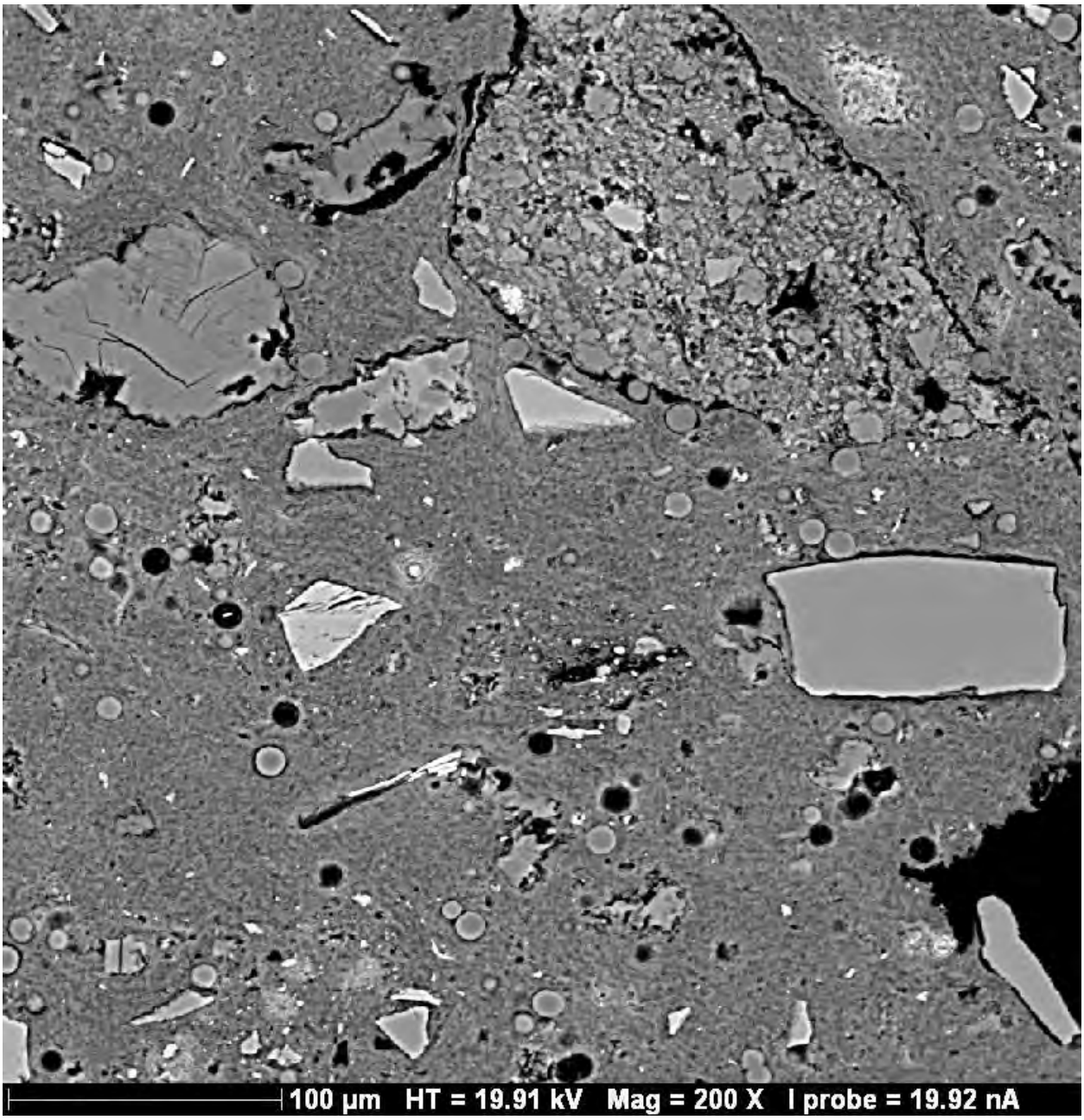
A.11-14 Secondary Electron image of copper corrosion. Note pit corrosion at left, mantled by chalcocite. Other surfaces unaltered due to shielding from fluids



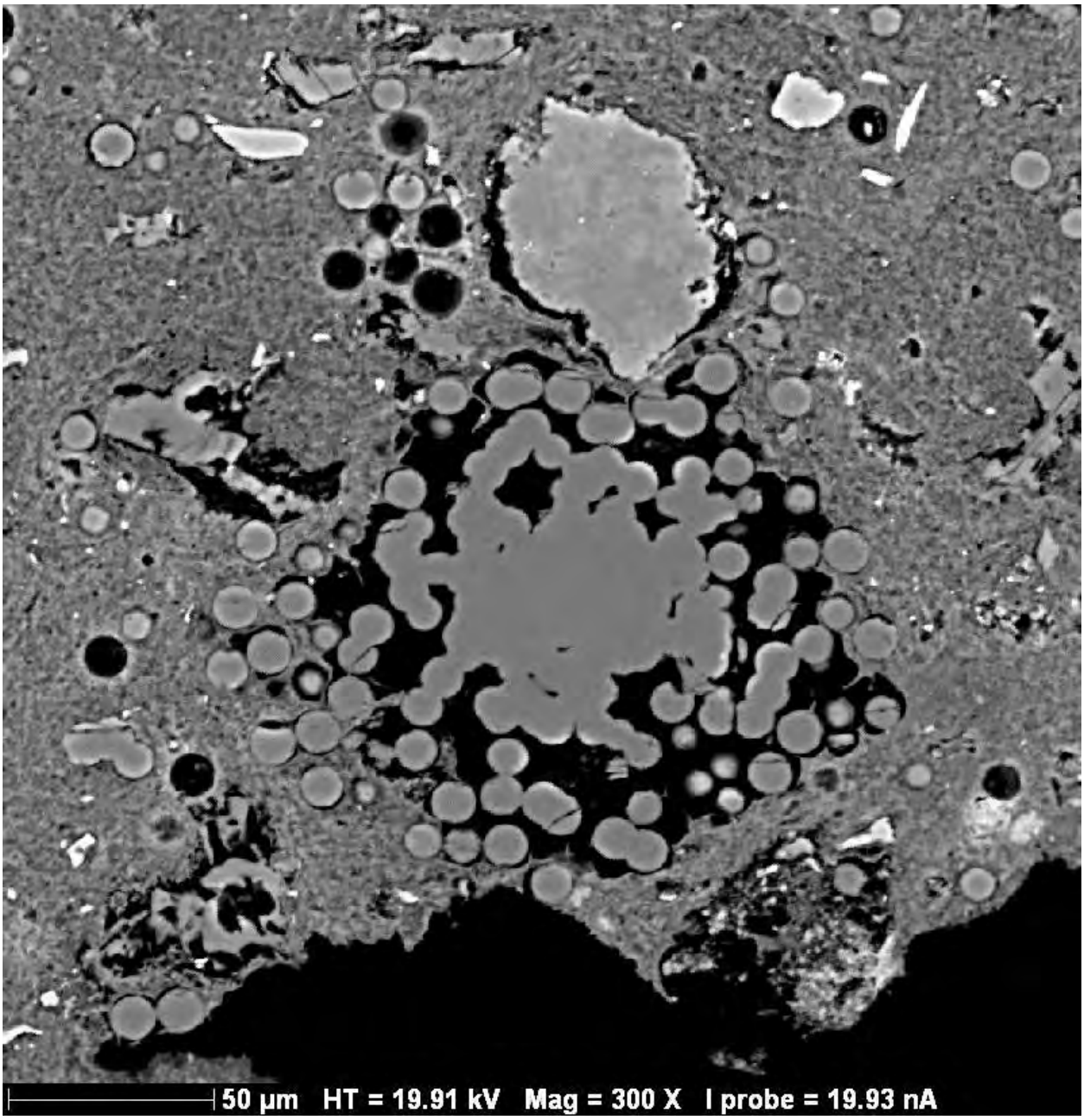
A.11-15 Backscattered Electron image of EBS-11thin section. Note abundance of analcime (dark gray spheres with white rims) growth in both matrix and xenolith



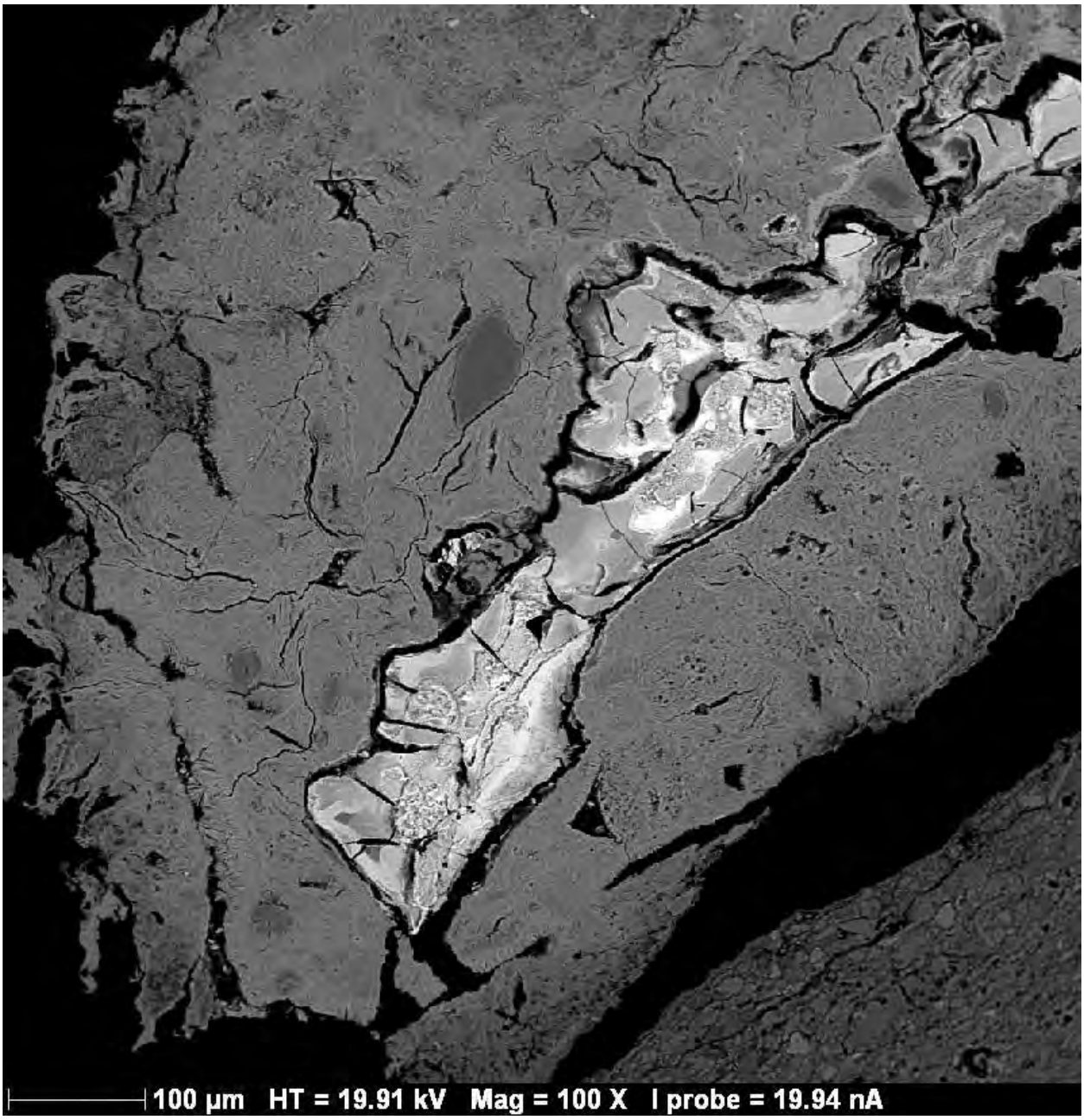
A.11-16 Backscattered Electron image of EBS-11thin section. Note abundance of analcime (dark gray spheres with white rims) growth in both matrix.



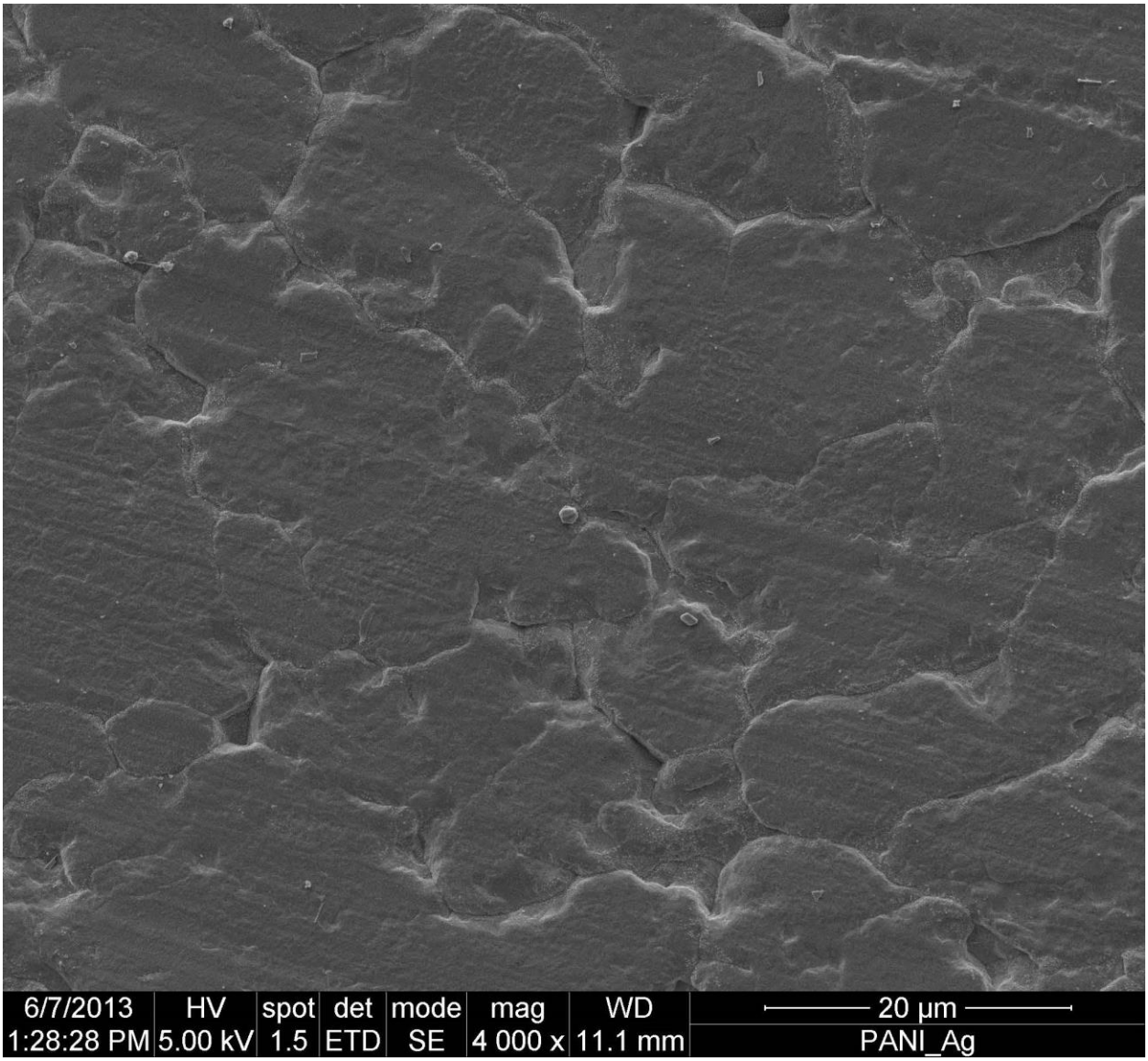
A.11-17 Backscattered Electron image of EBS-11thin section. Note abundance of analcime (dark gray spheres with white rims) growth in both matrix and xenolith



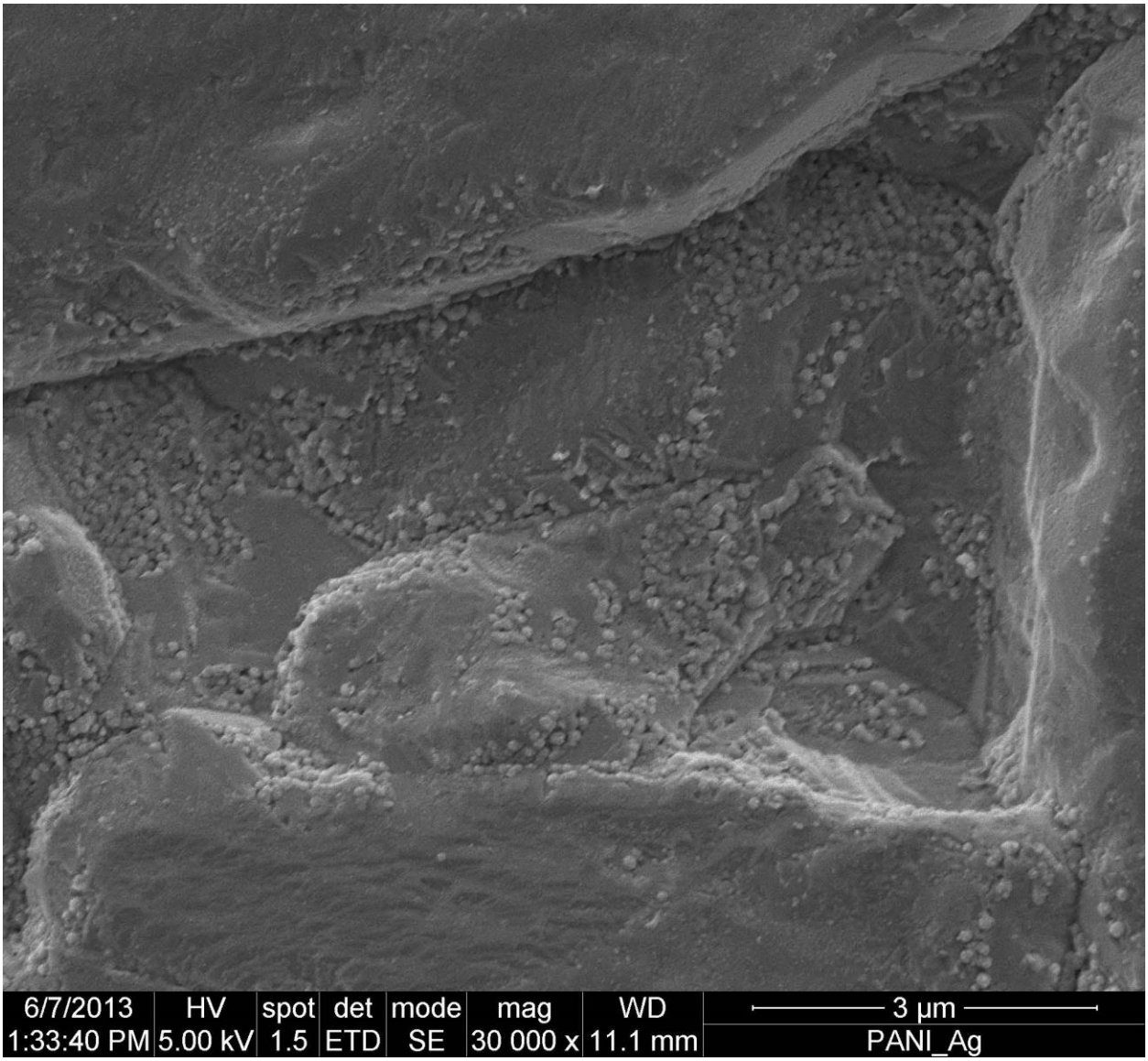
A.11-18 Backscattered Electron image of EBS-11thin section. Note abundance of analcime (dark gray spheres with white rims) growth within precurser pumice lapilli. Pumice was originally glass, hence the obvious volume reduction.



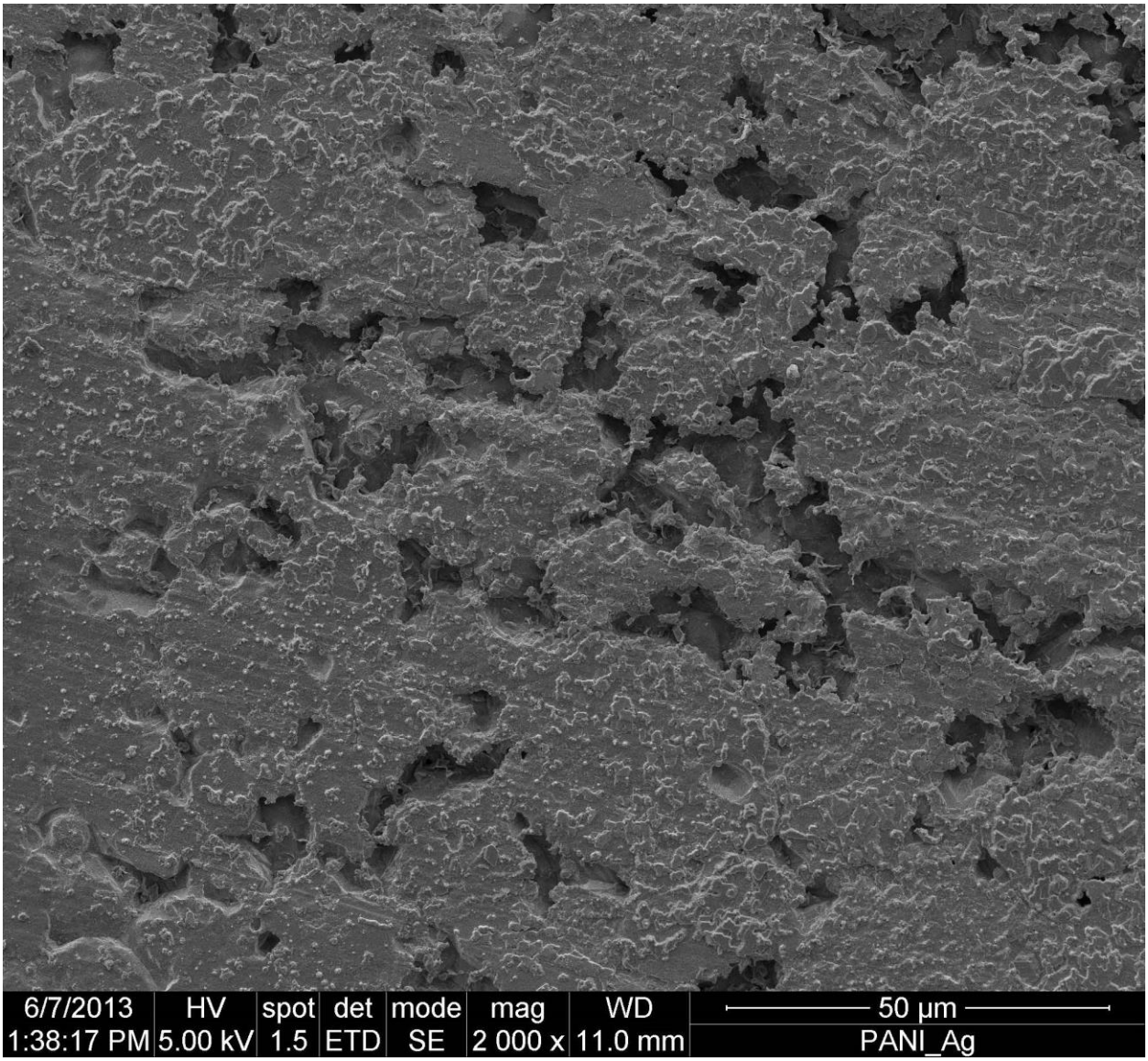
A.11-19 Backscattered Electron image of EBS-11thin section. Note native iron mantled by stipnomalene overgrowth



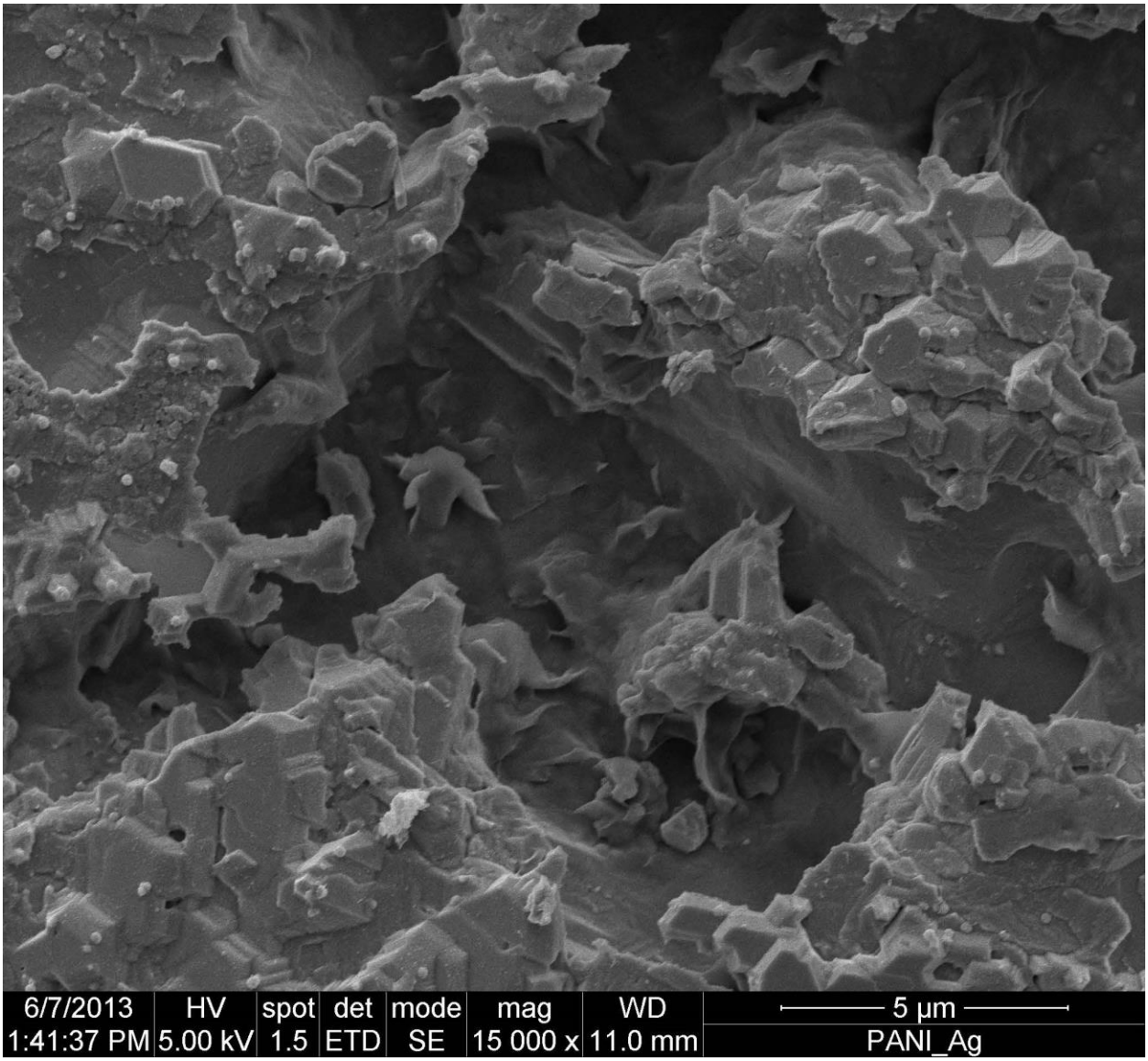
A.11-20: SEM image of unaltered copper surface from EBS 11



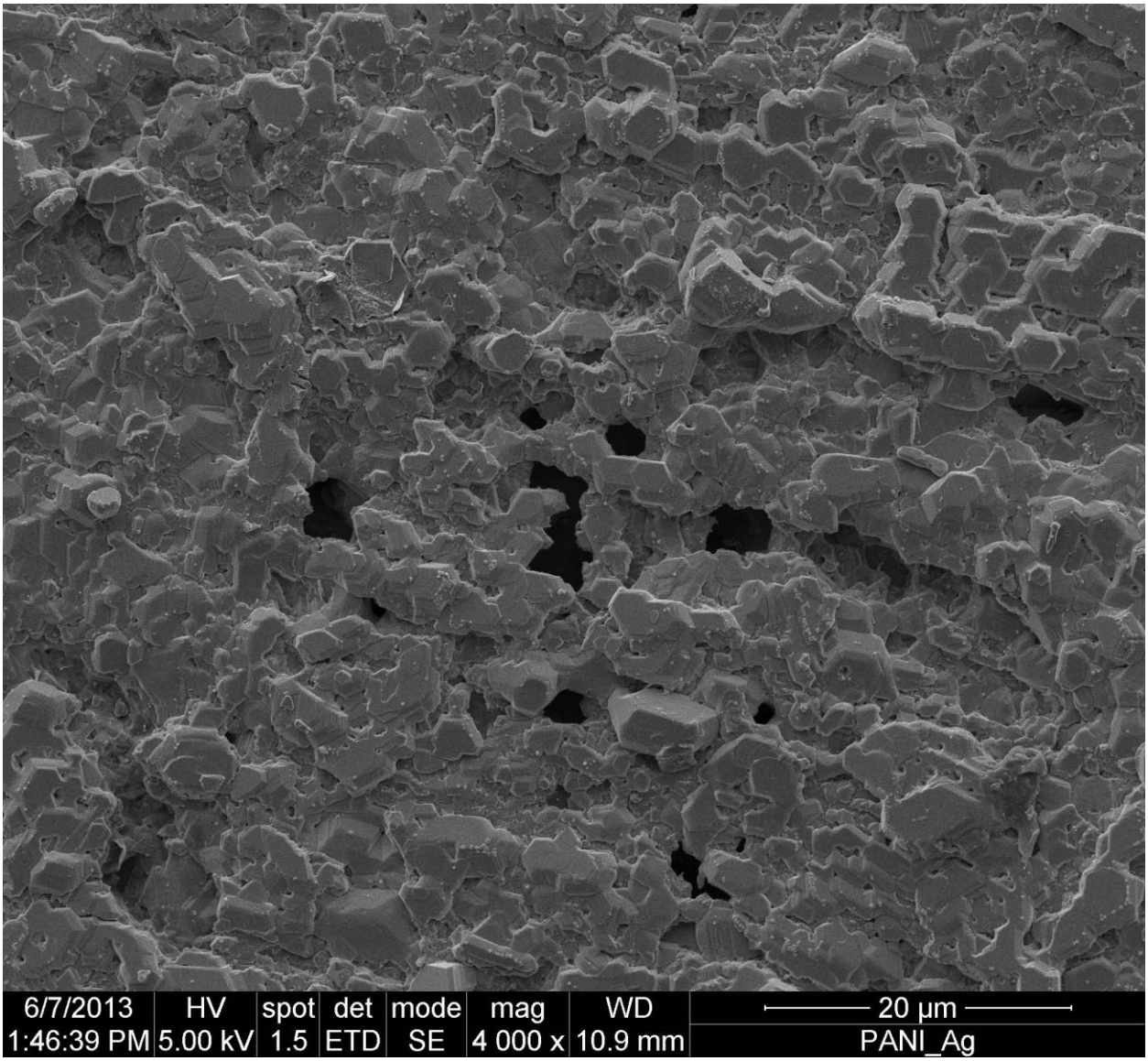
A.11-21: SEM image of chalcocite in pit corrosion crevice from EBS 11



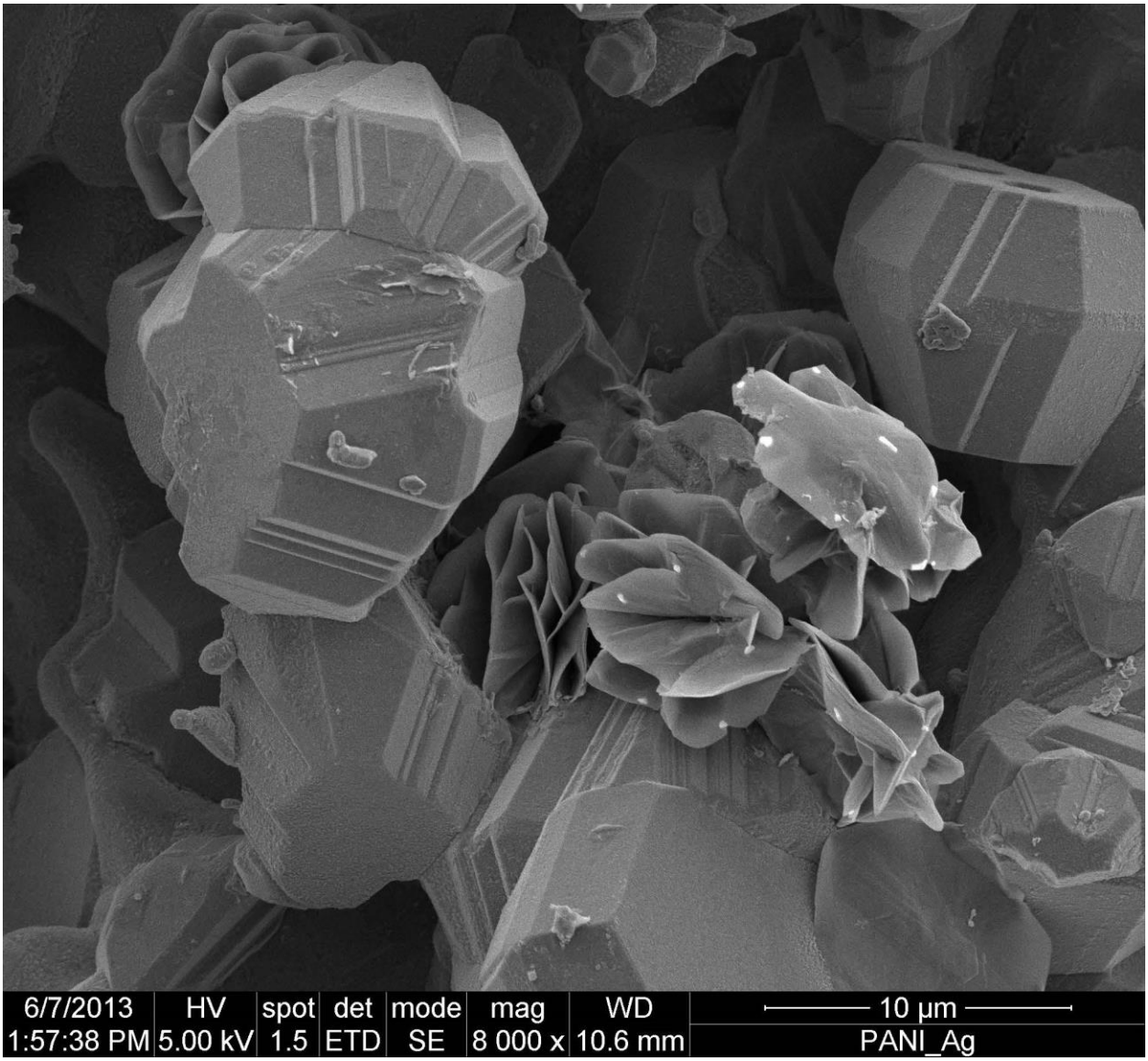
A.11-22: SEM image of incomplete coverage of sulfide growth on copper



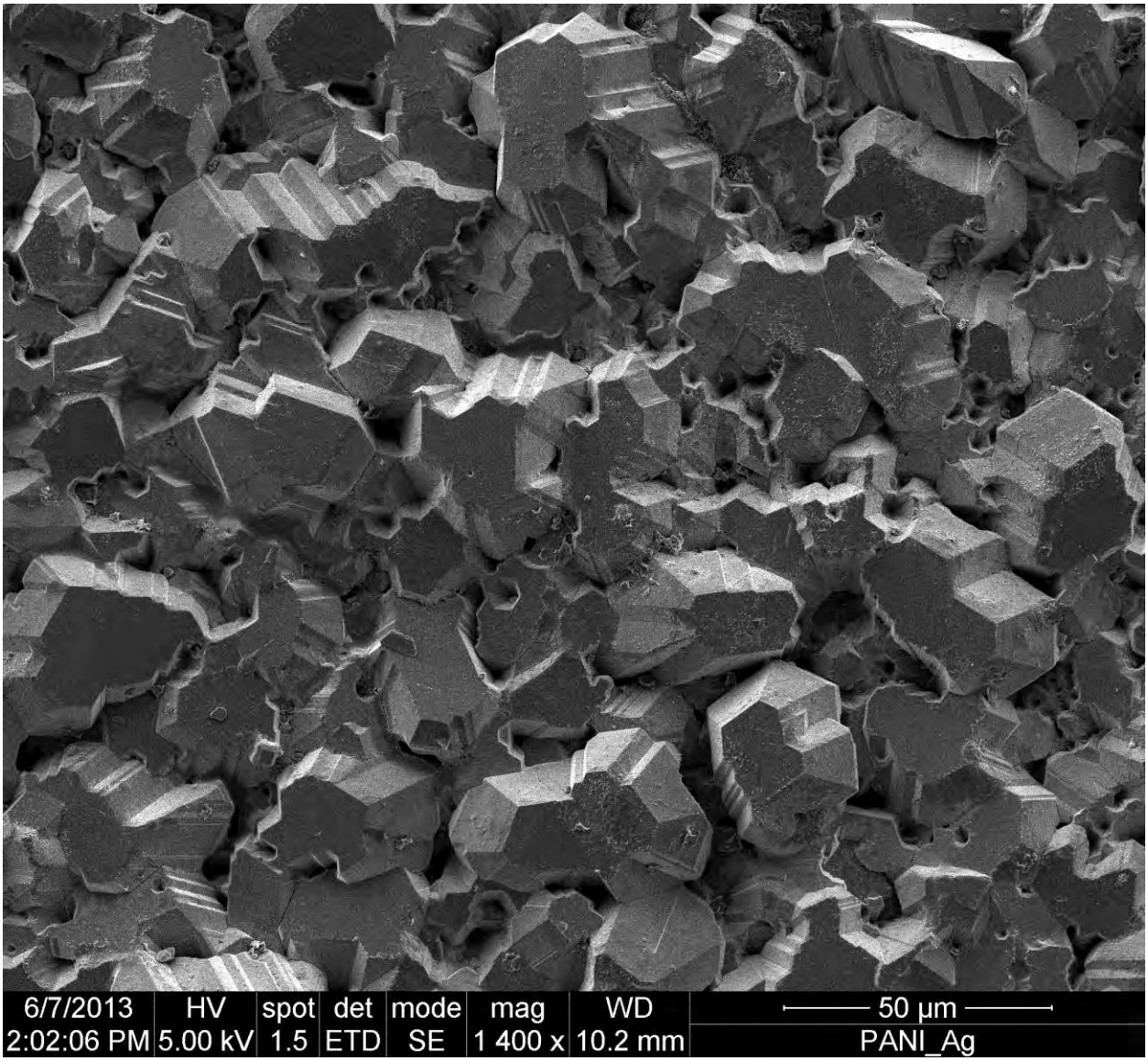
A.11-23: SEM image of chalcocite growth at grain boundary



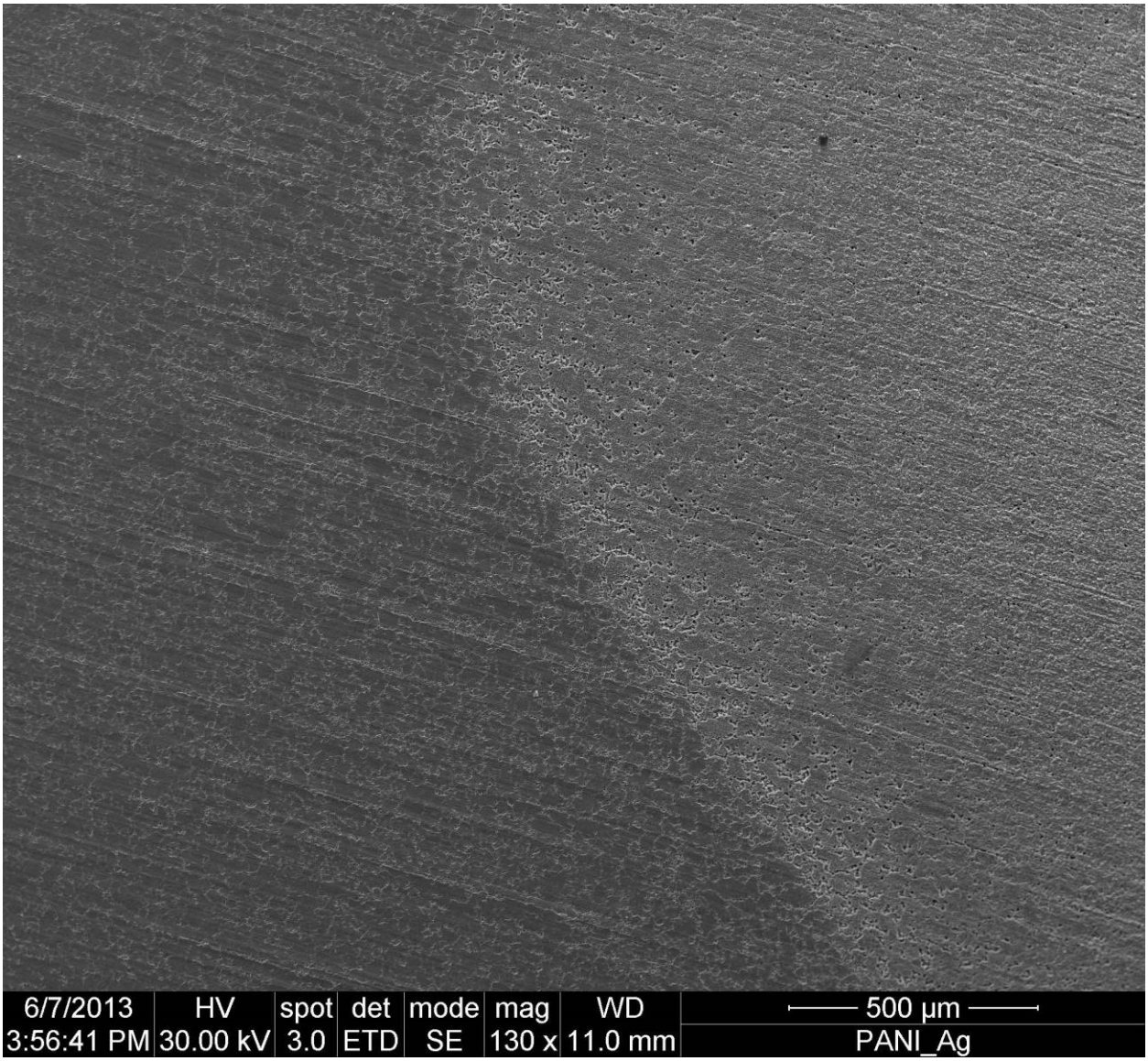
A.11-24: SEM image of oriented chalcocite growth



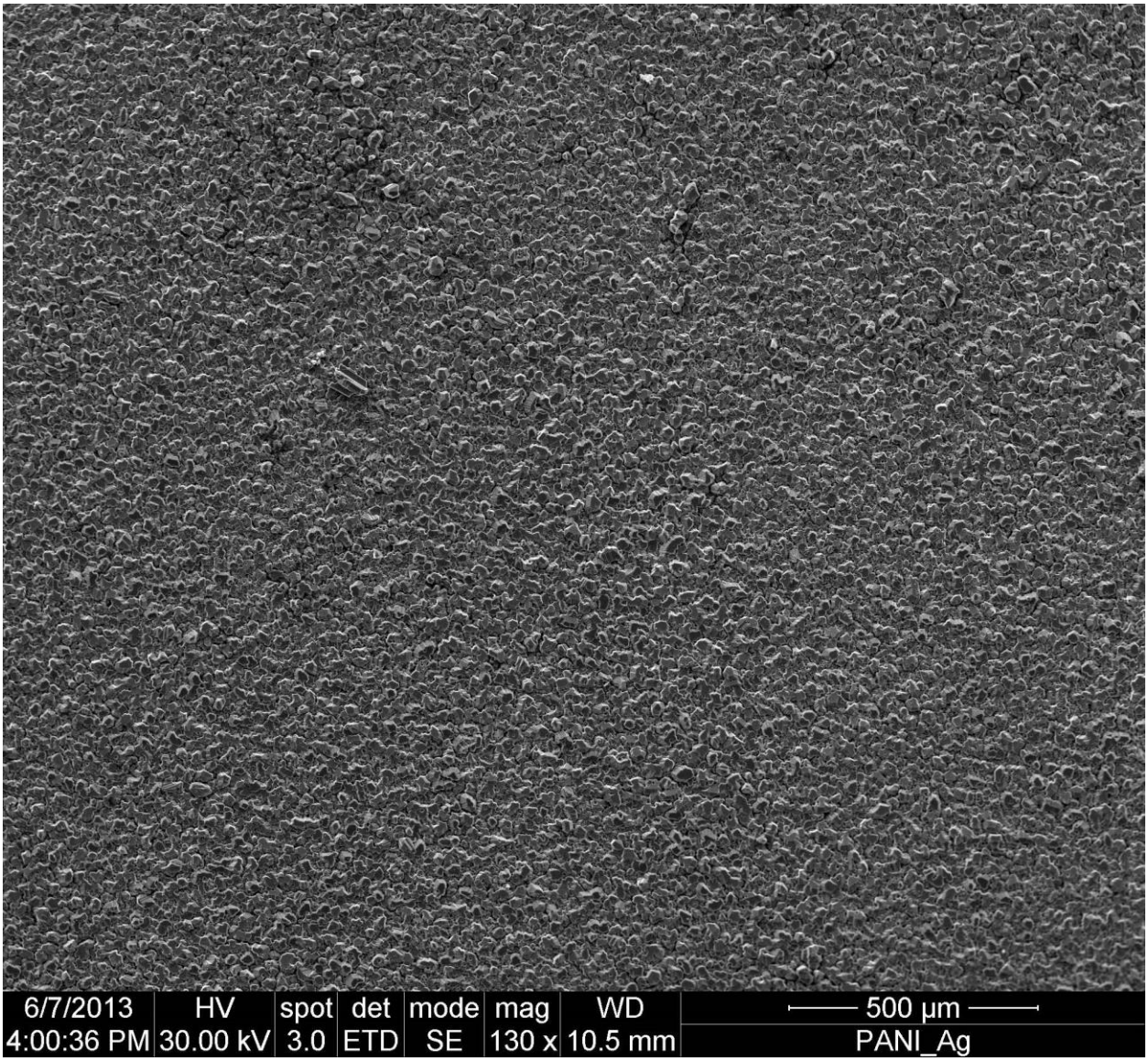
A.11-25: SEM image of chalcocite



A.11-26: SEM image of almost complete coverage of chalcocite mat



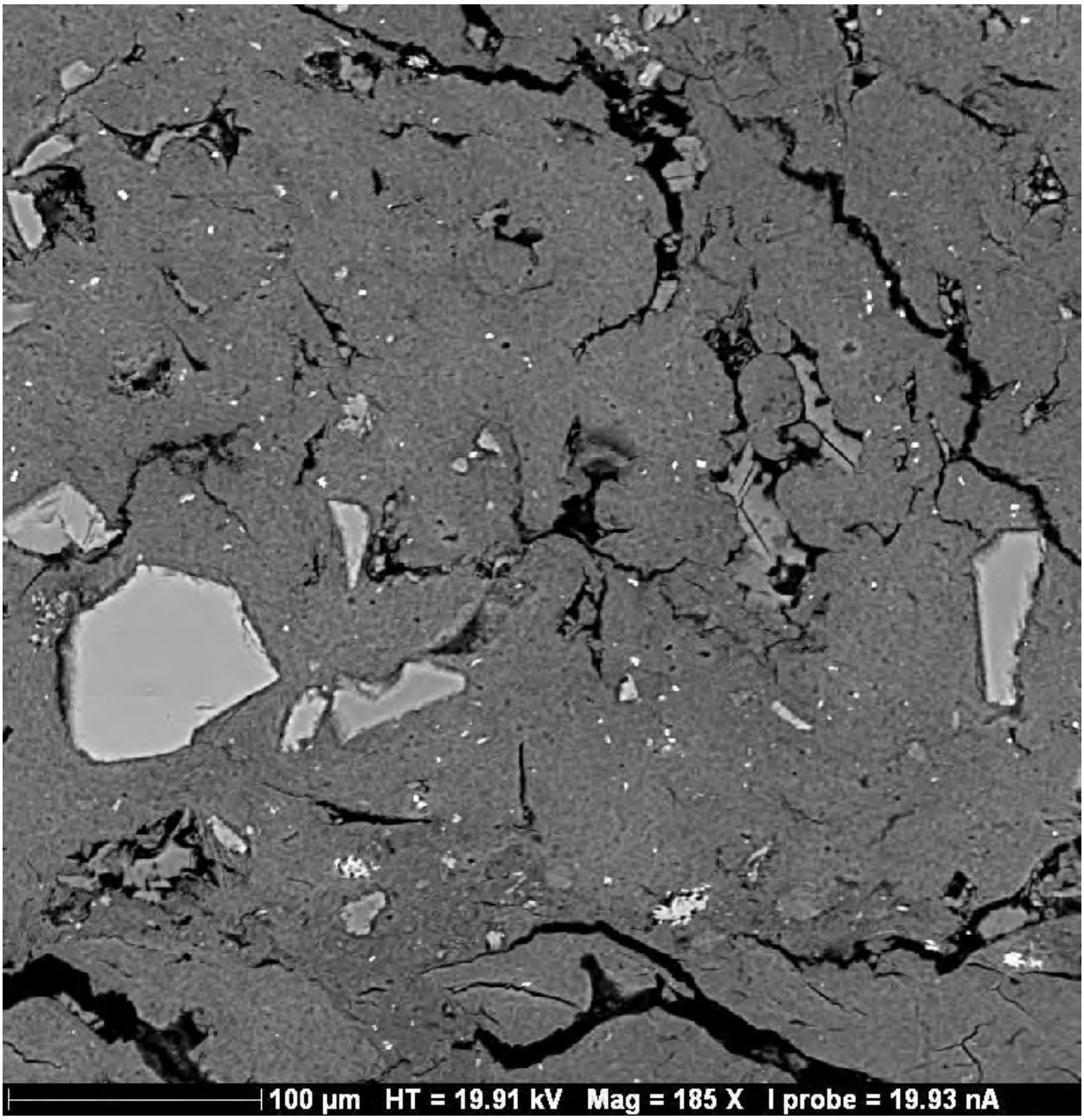
A.11-27: SEM image of copper corrosion surface



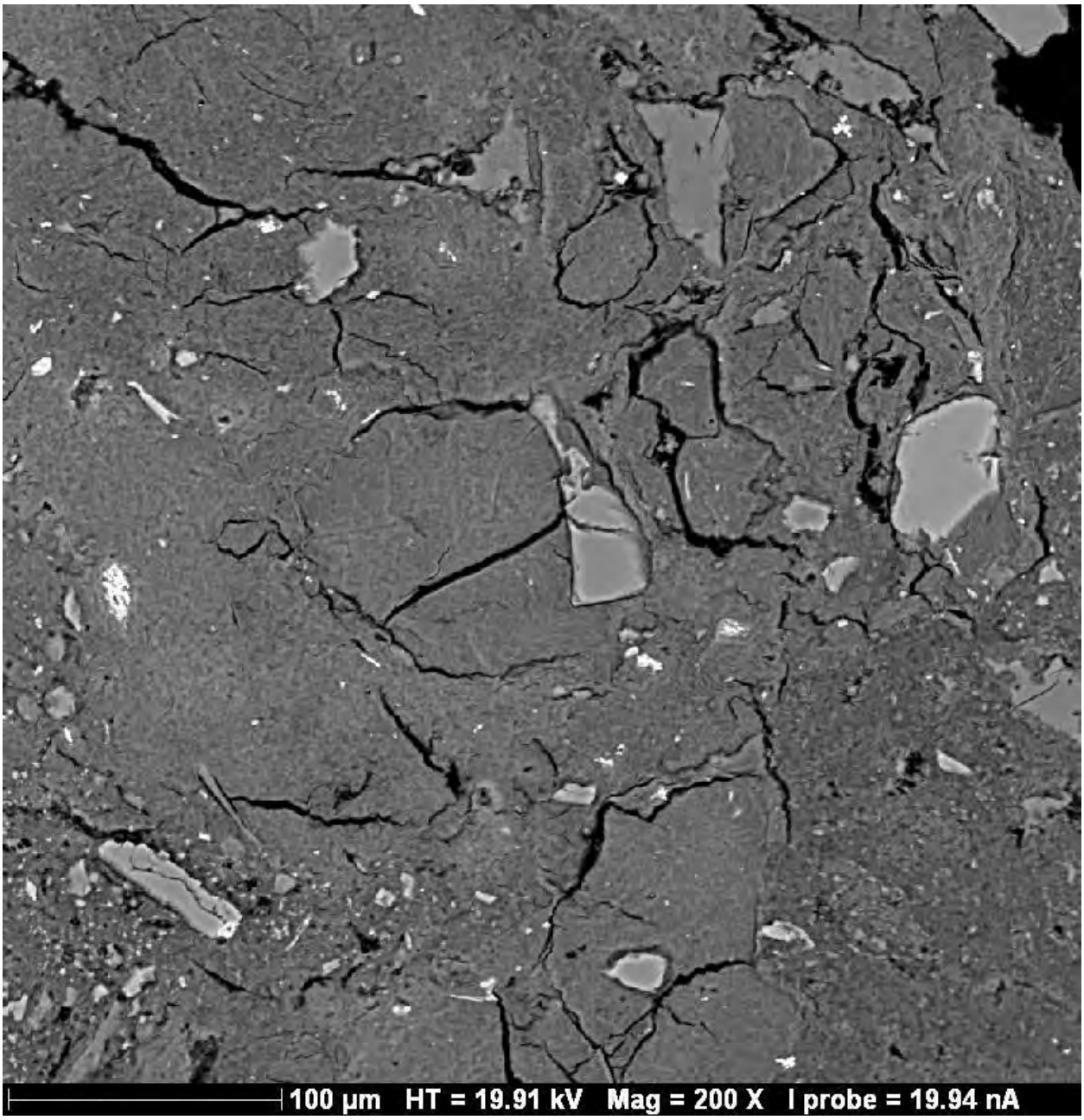
A.11-28: SEM image of complete coverage of chalcocite mat

Appendix A.12

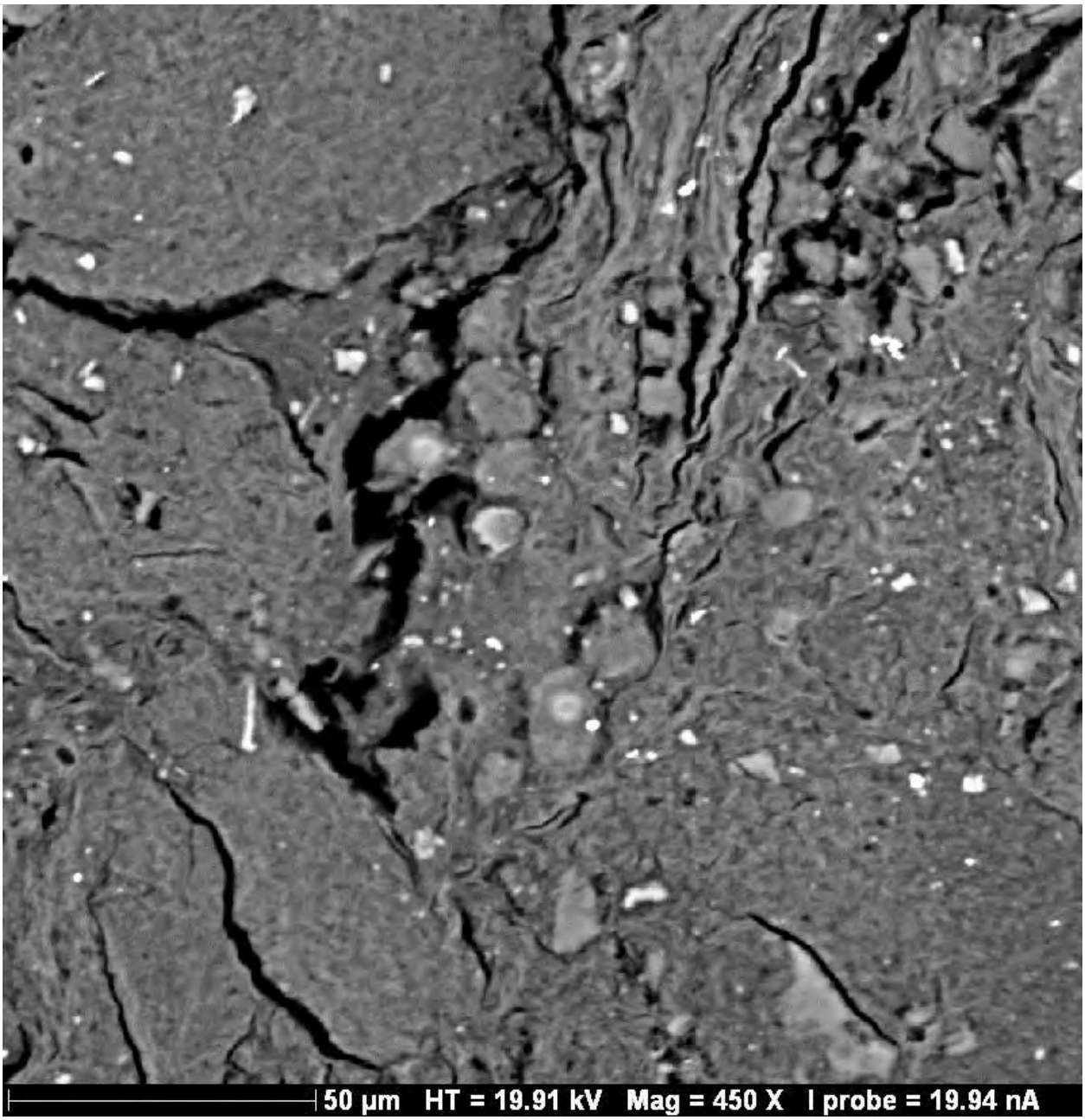
EBS-12 Isothermal at 300°C and 150 bar for 7 weeks, with low water content. Designed and run for LBNL



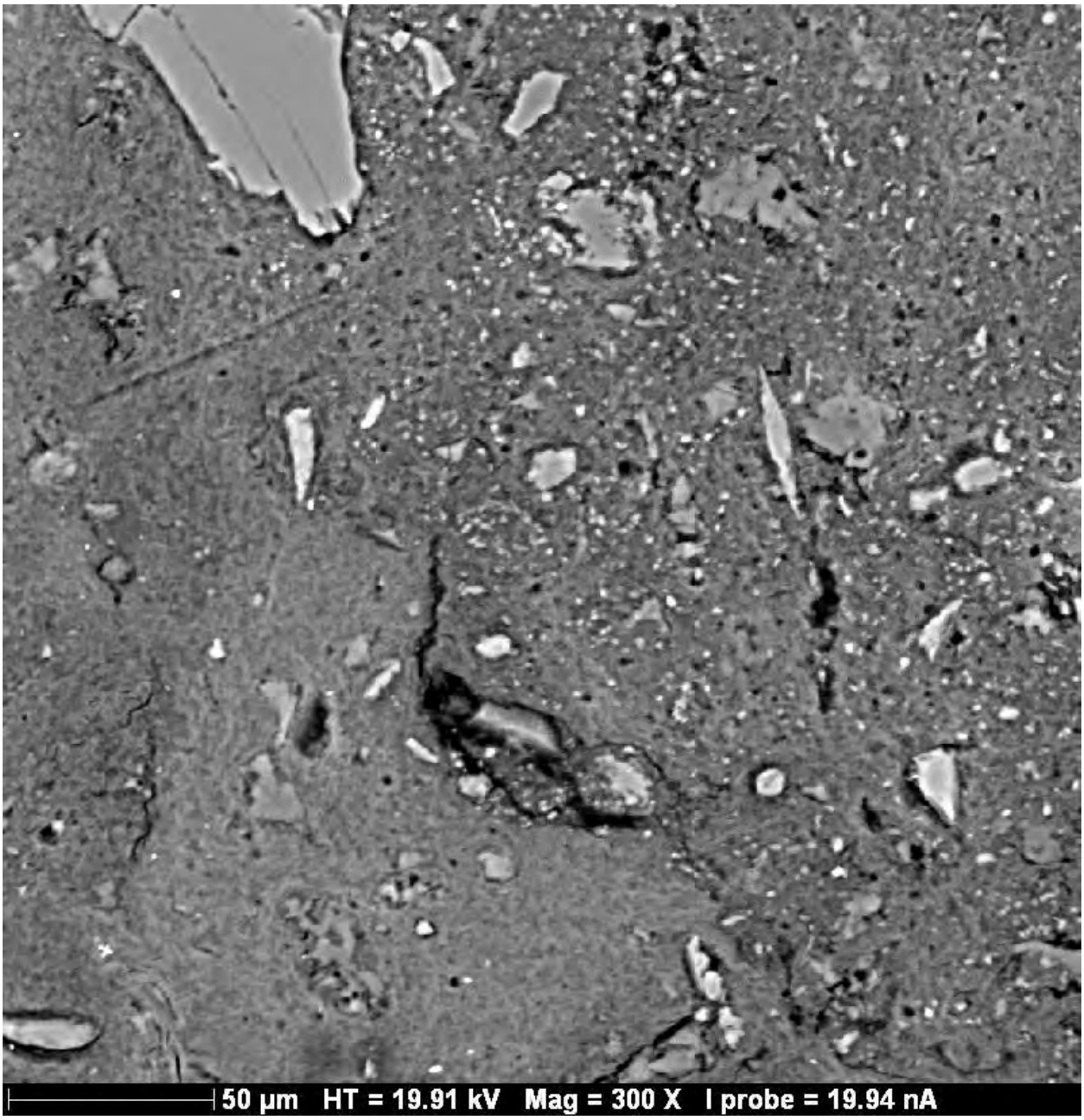
A.12-1: SEM image of EBS 12 thin section. Note paucity of zeolite phases.



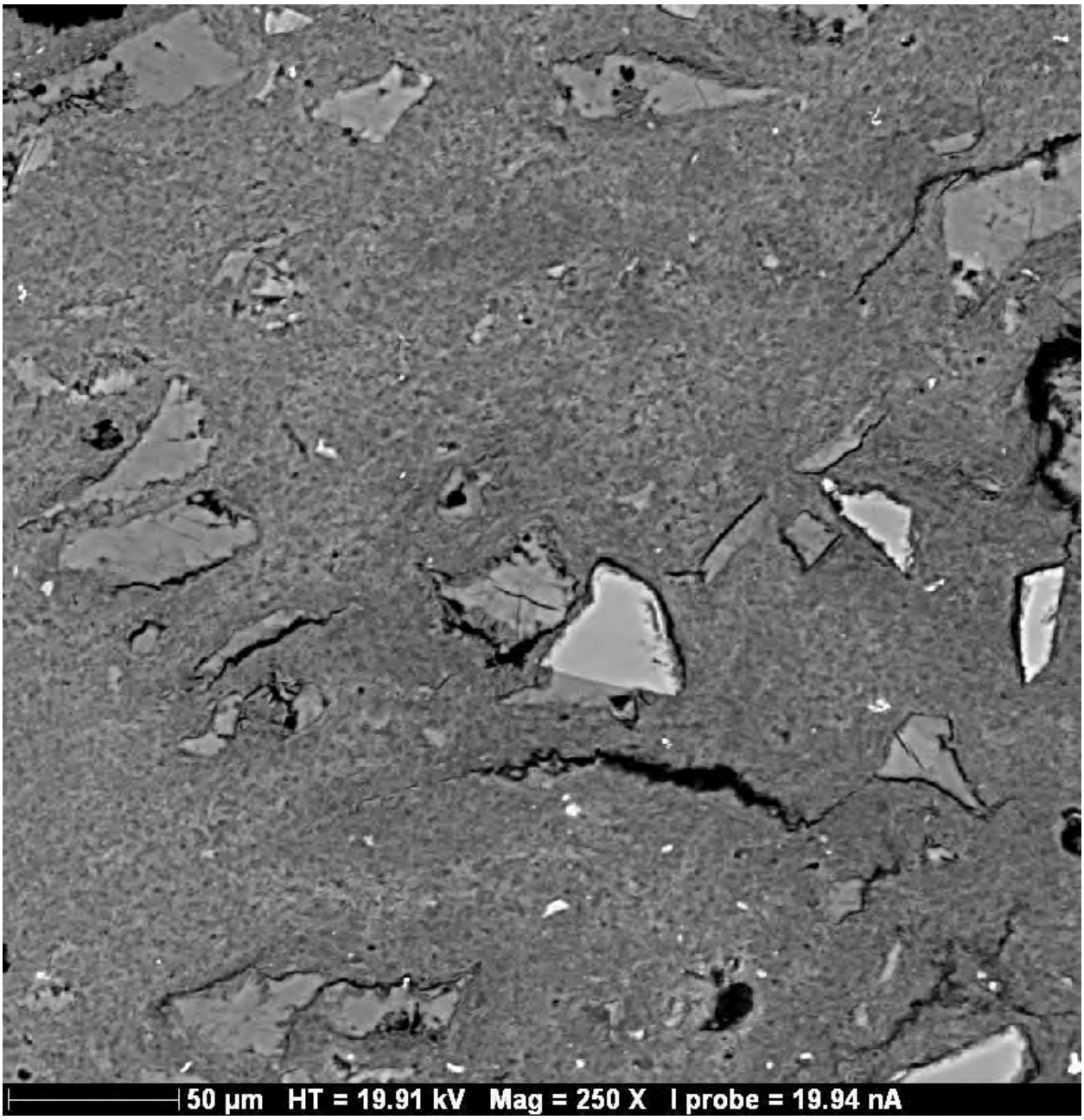
A.12-2: SEM image of EBS 12 thin section. Note paucity of zeolite phases



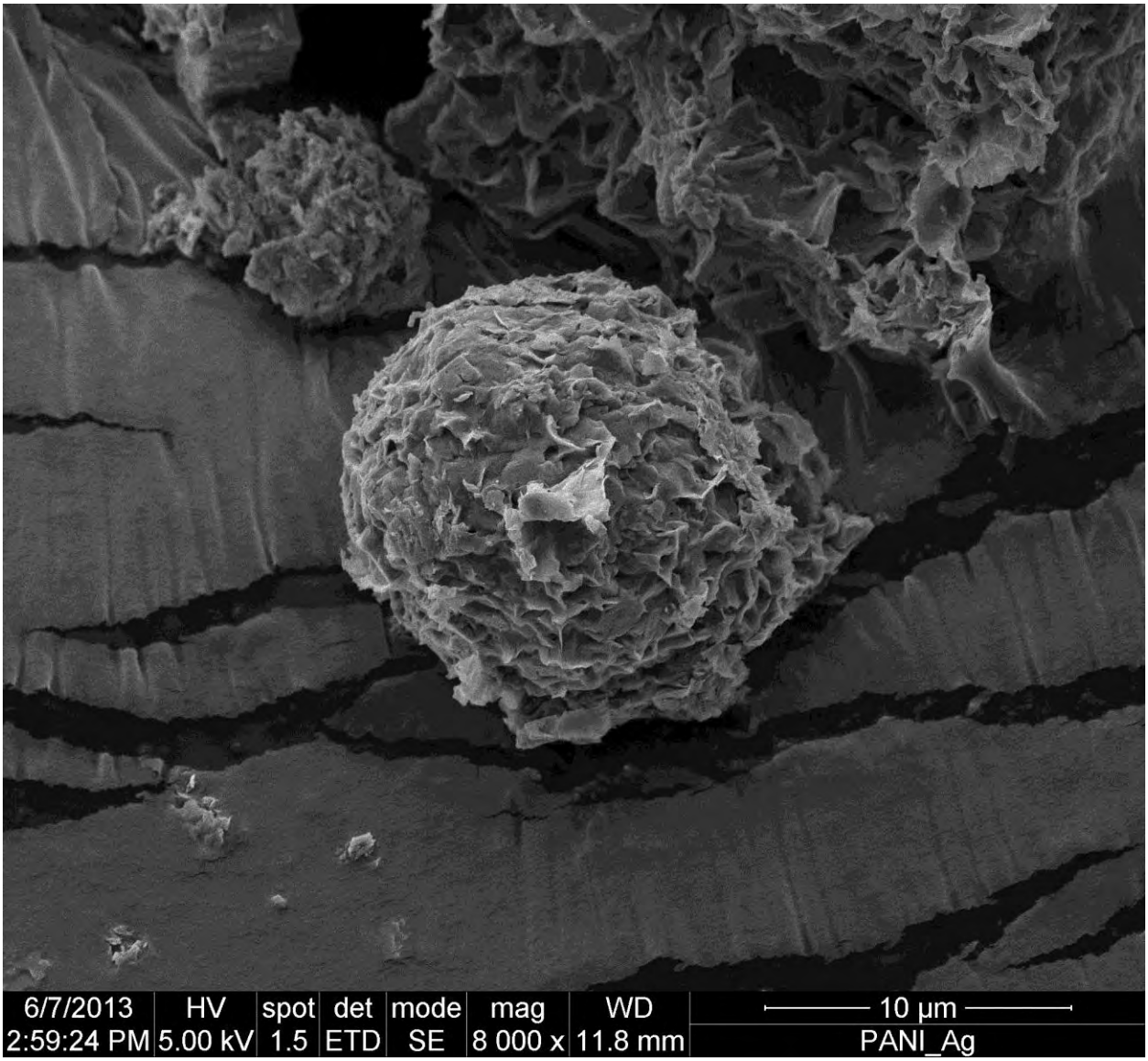
A.12-3: SEM image of EBS 12 thin section. Note analcime replacing pumice lapilli from Colony bentonite



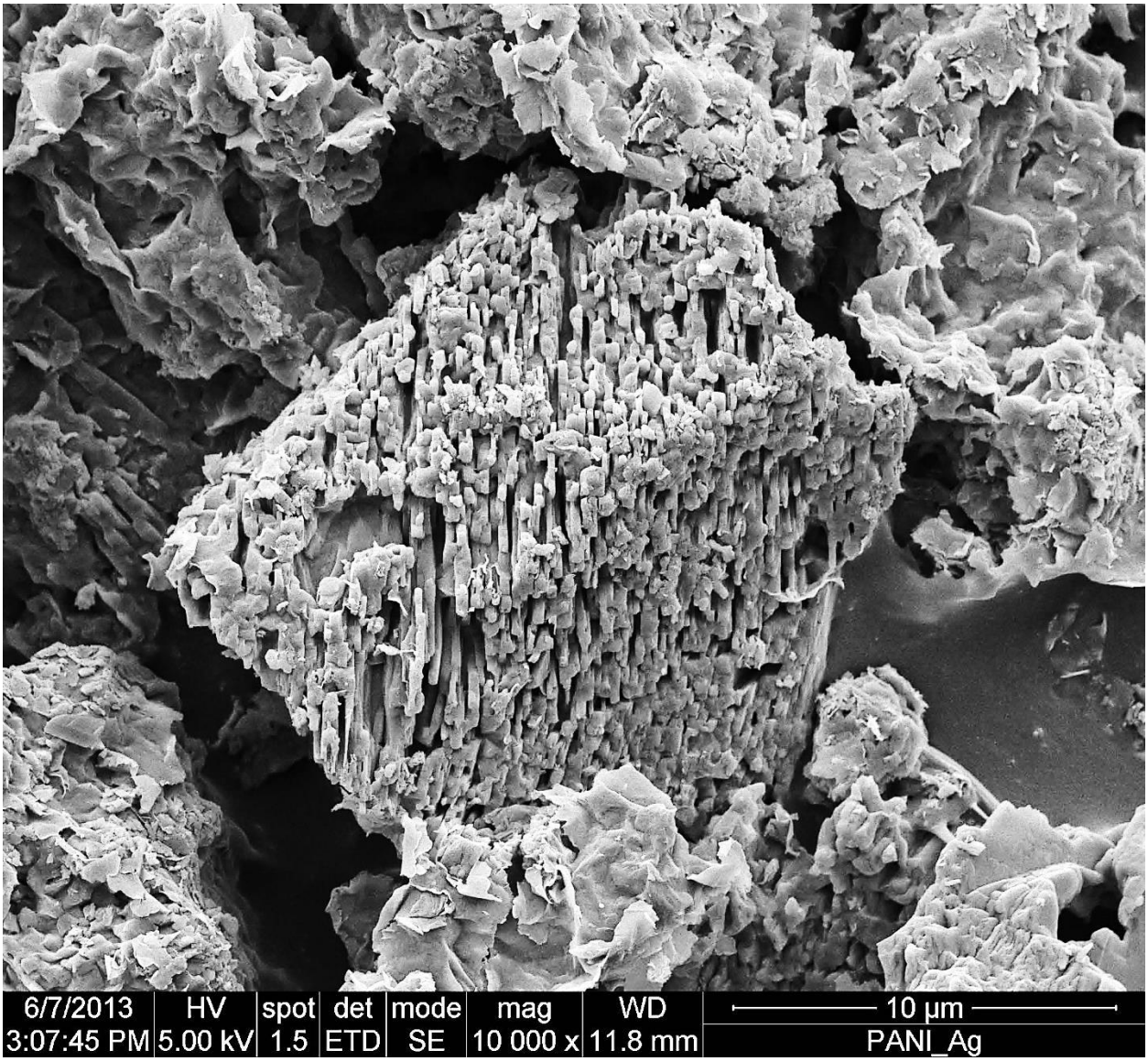
A.12-4: SEM image of EBS 12 thin section. Note few analcime crystals in Colony bentonite matrix on right



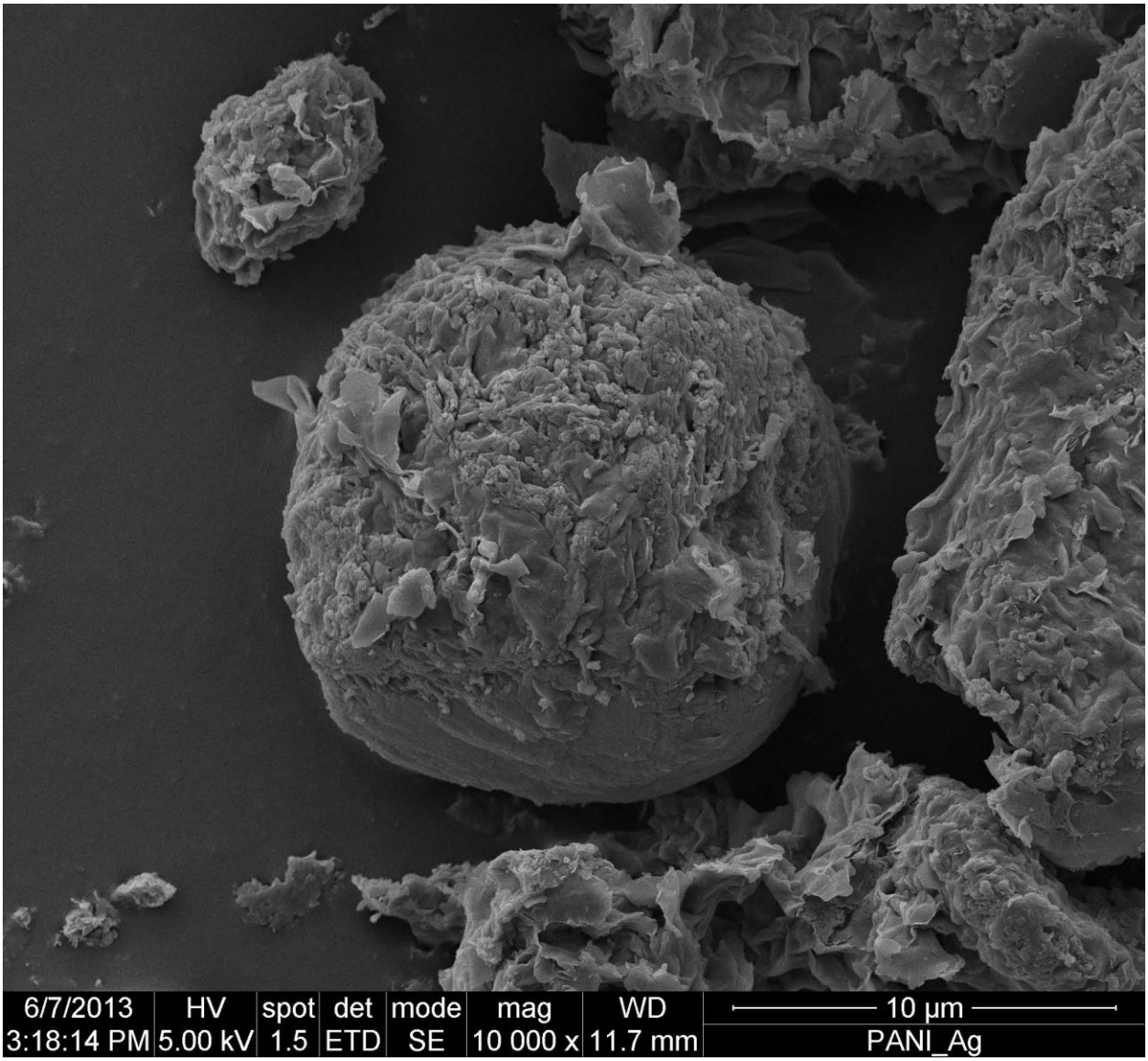
A.12-5: SEM image of EBS 12 thin section. Note paucity of zeolite phases.



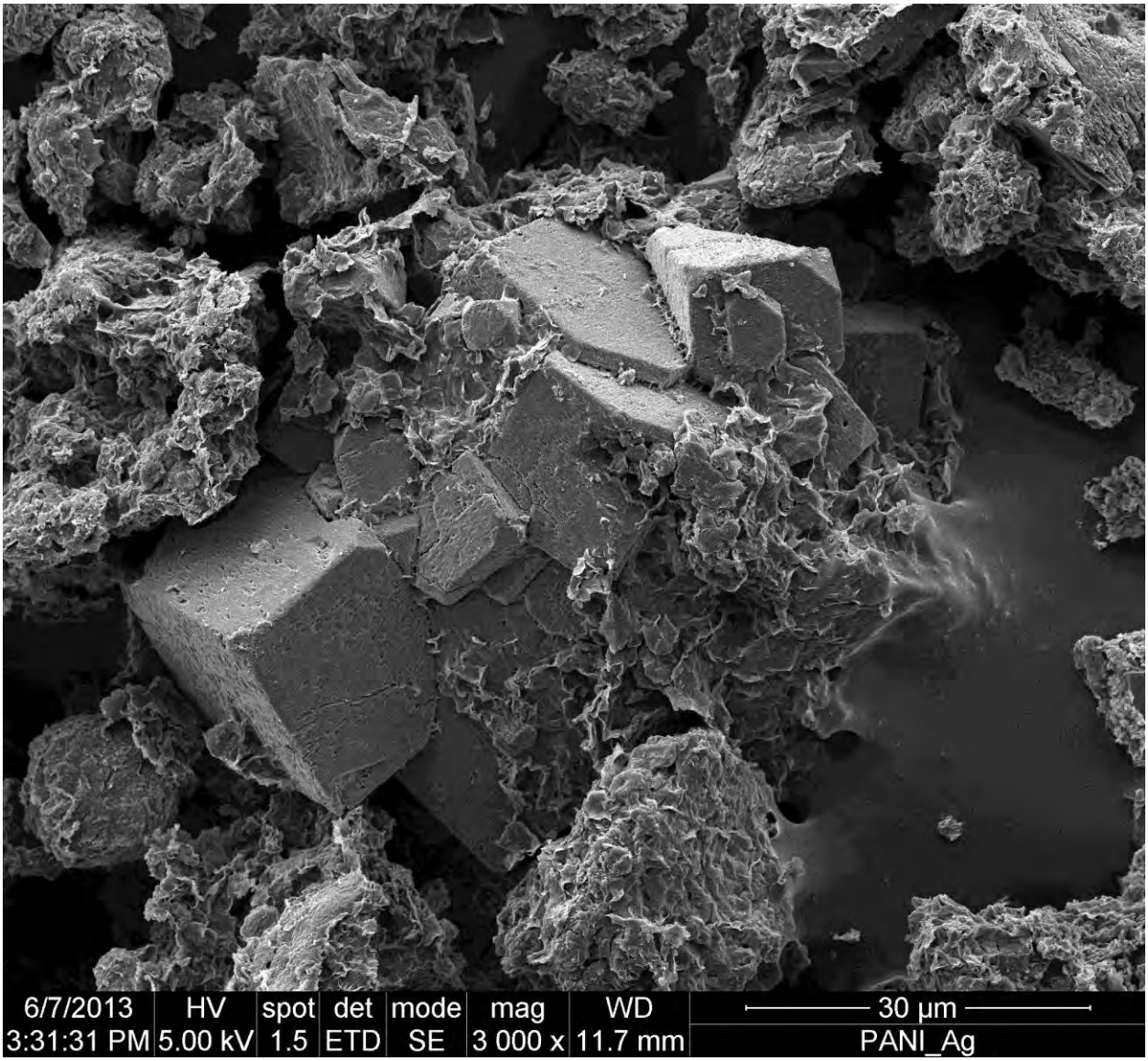
A.12-6: SEM image of Analcime covered by clay



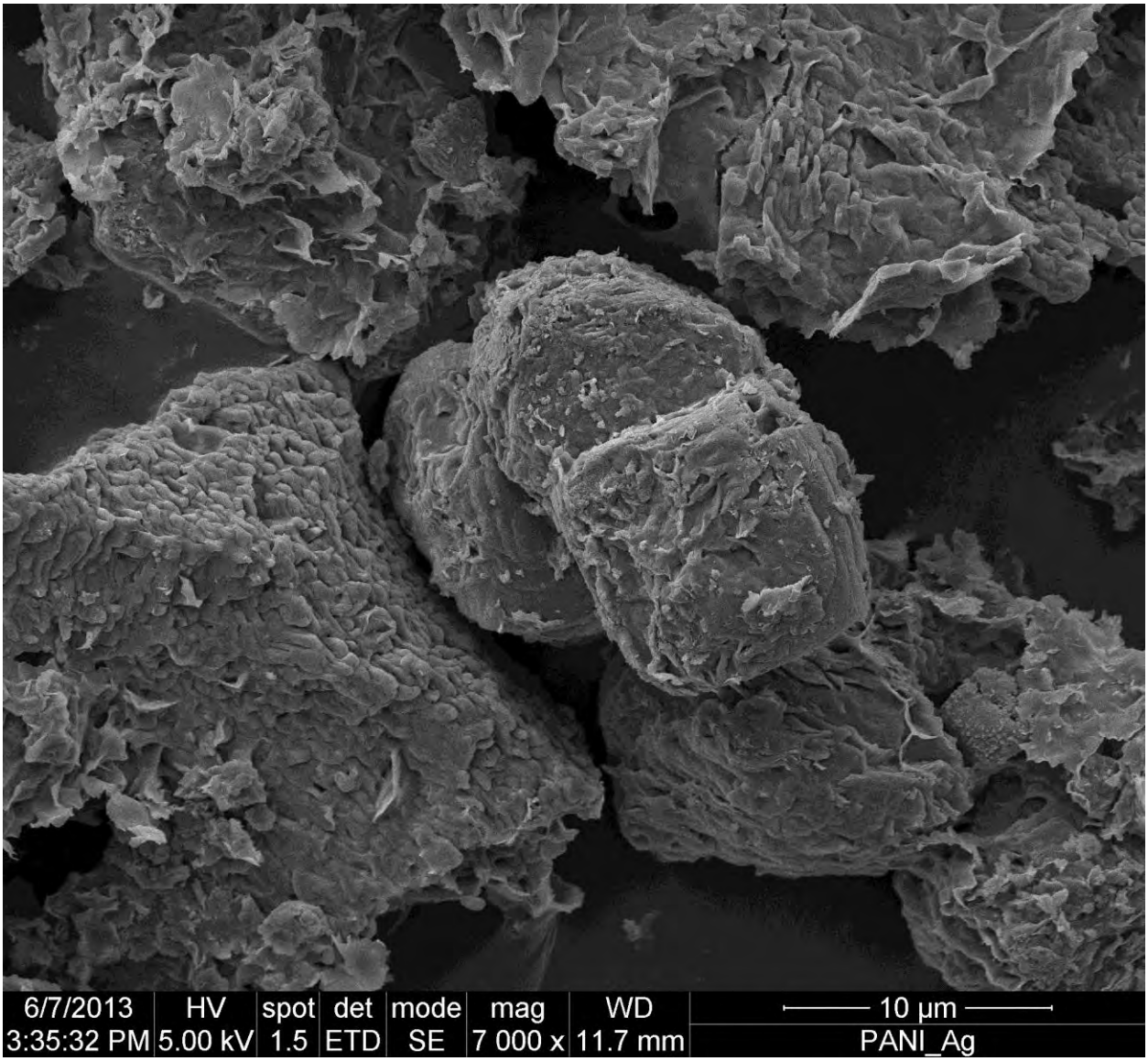
A.12-7: SEM image of corroded Clinoptilolite in foily smectite



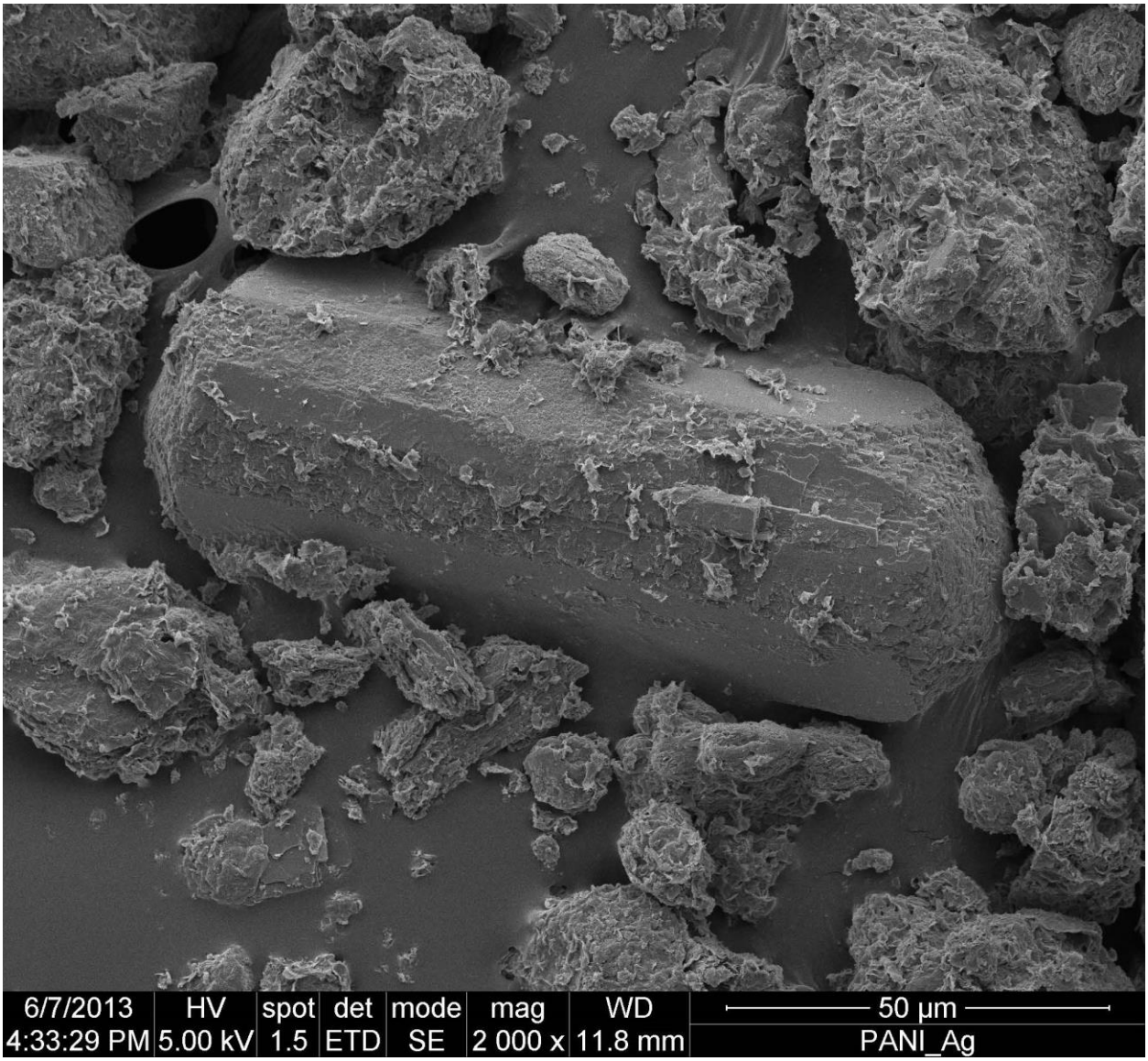
A.12-8: SEM image of corroded smectite on top of quartz grain



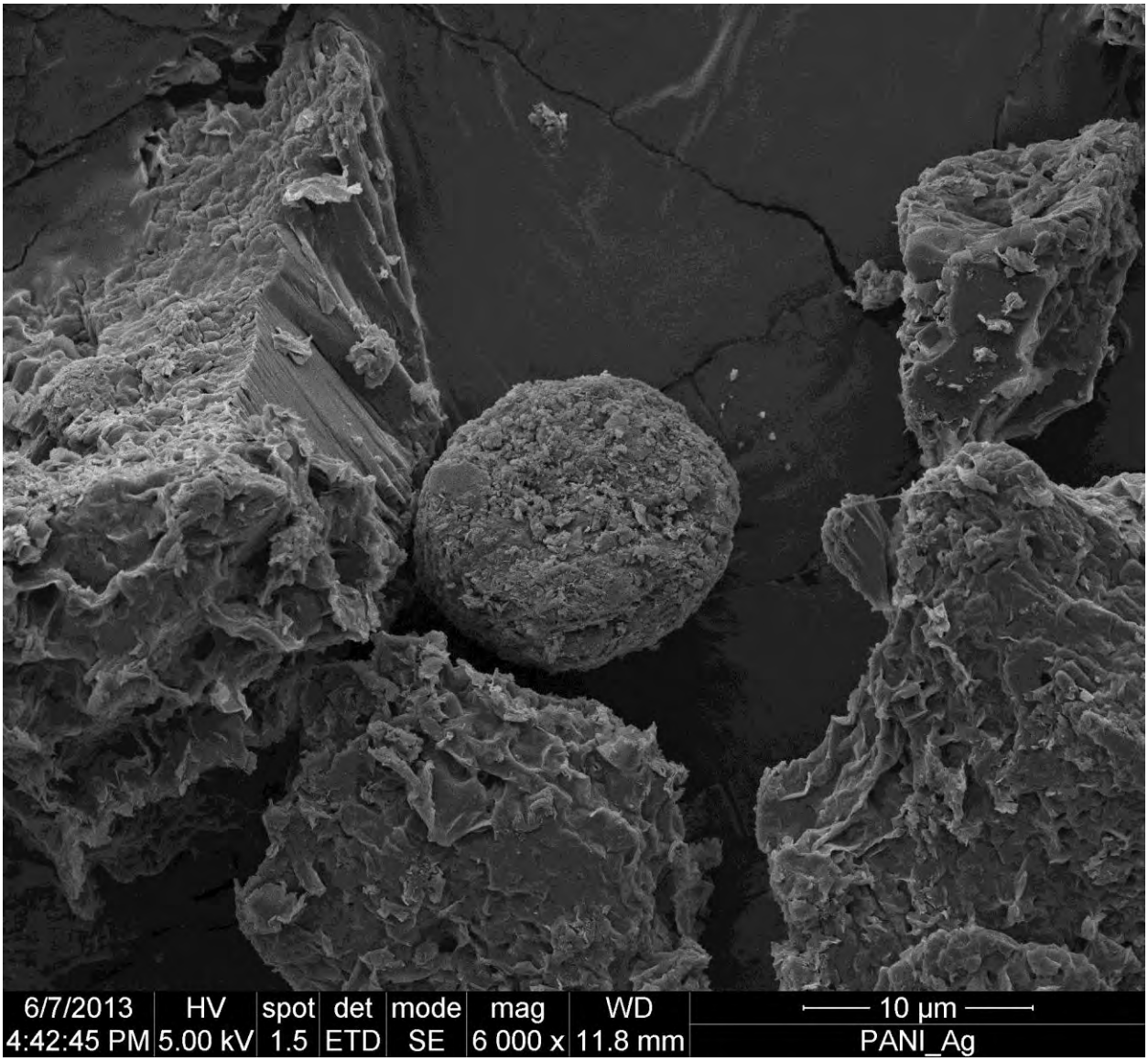
A.12-9: SEM image of pyrite cluster from EBS 12



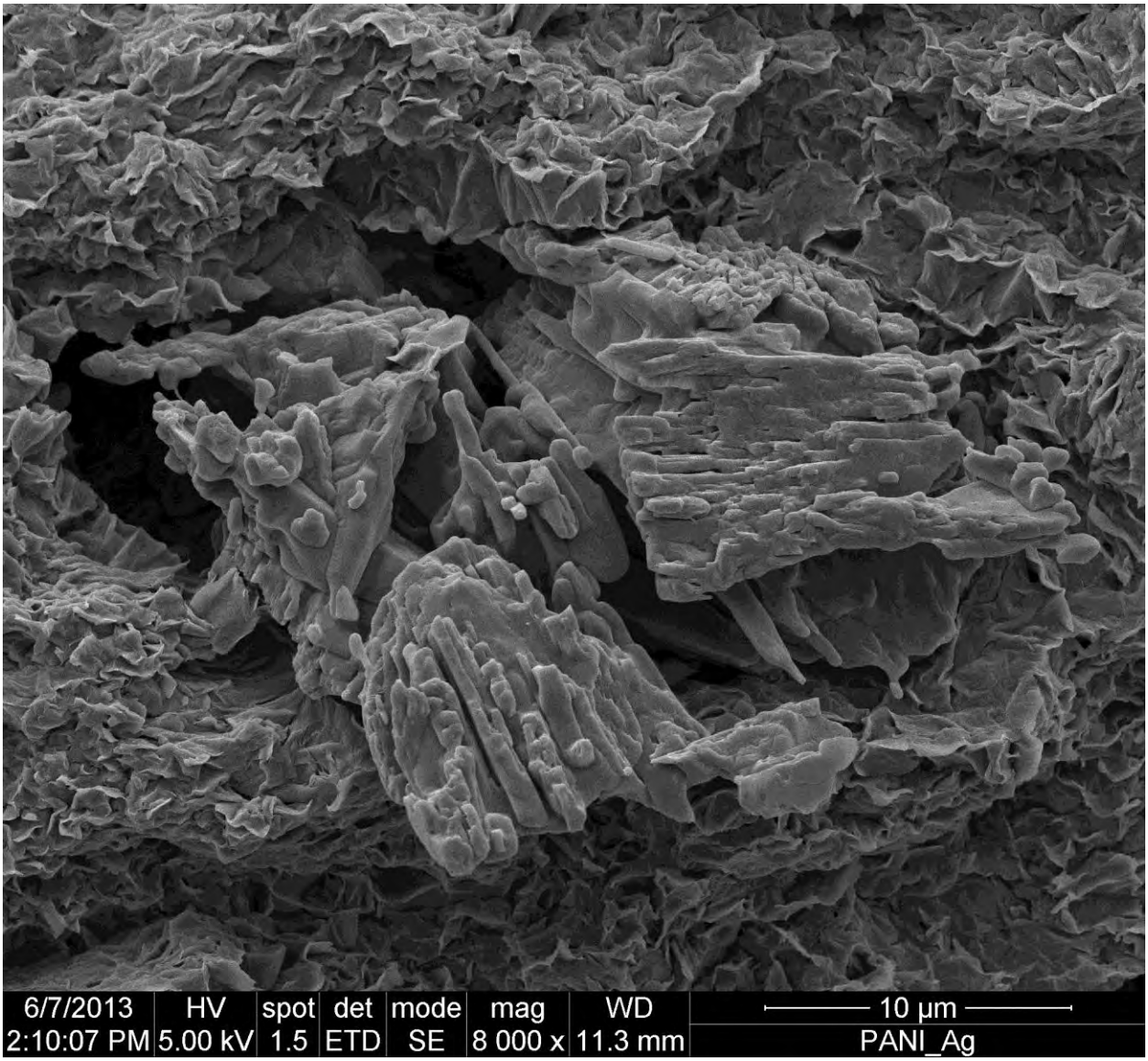
A.12-10: SEM image of Clinoptilolite on left and possible Analcime in center



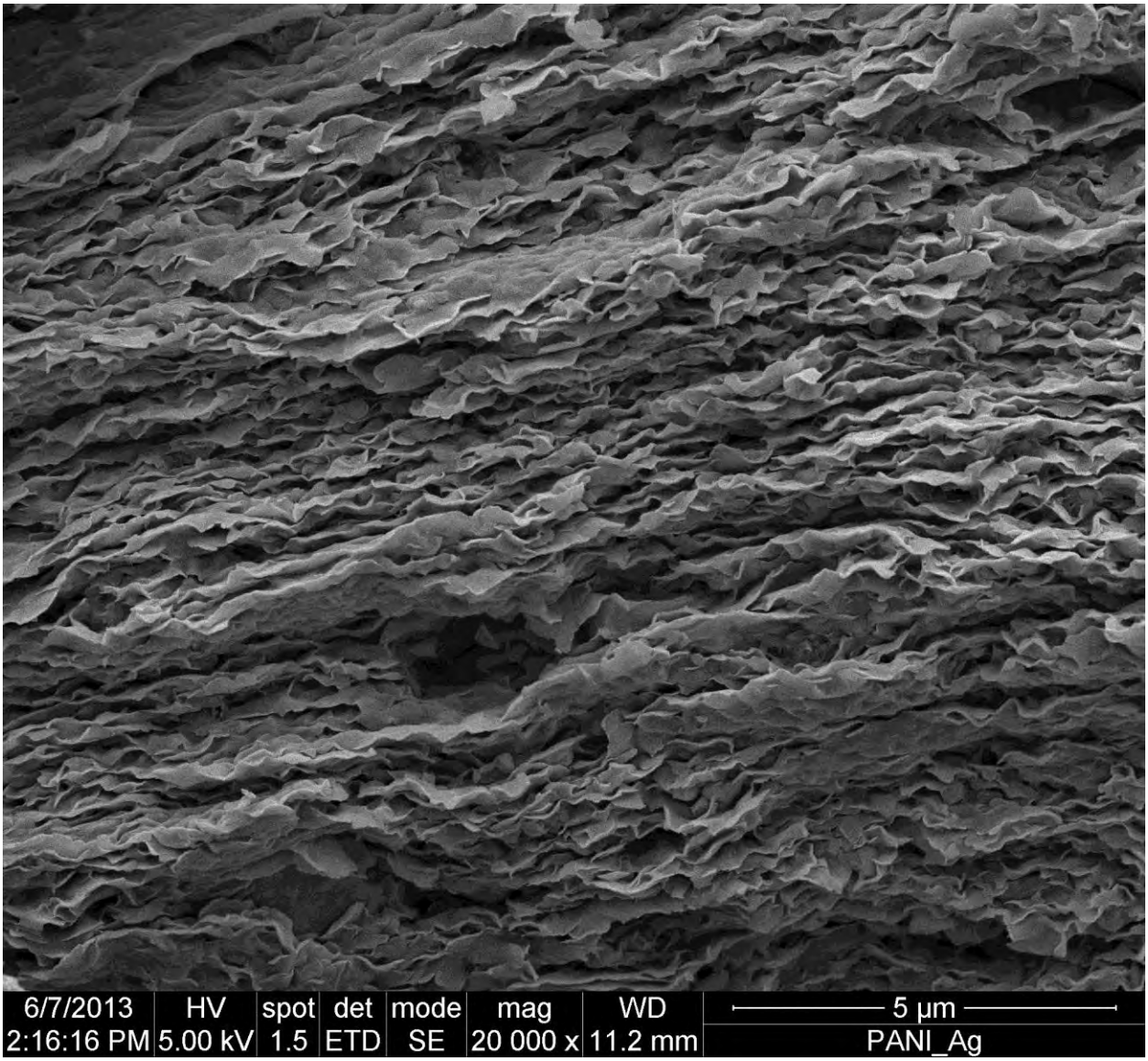
A.12-11: SEM image of apatite phenocryst from EBS 12



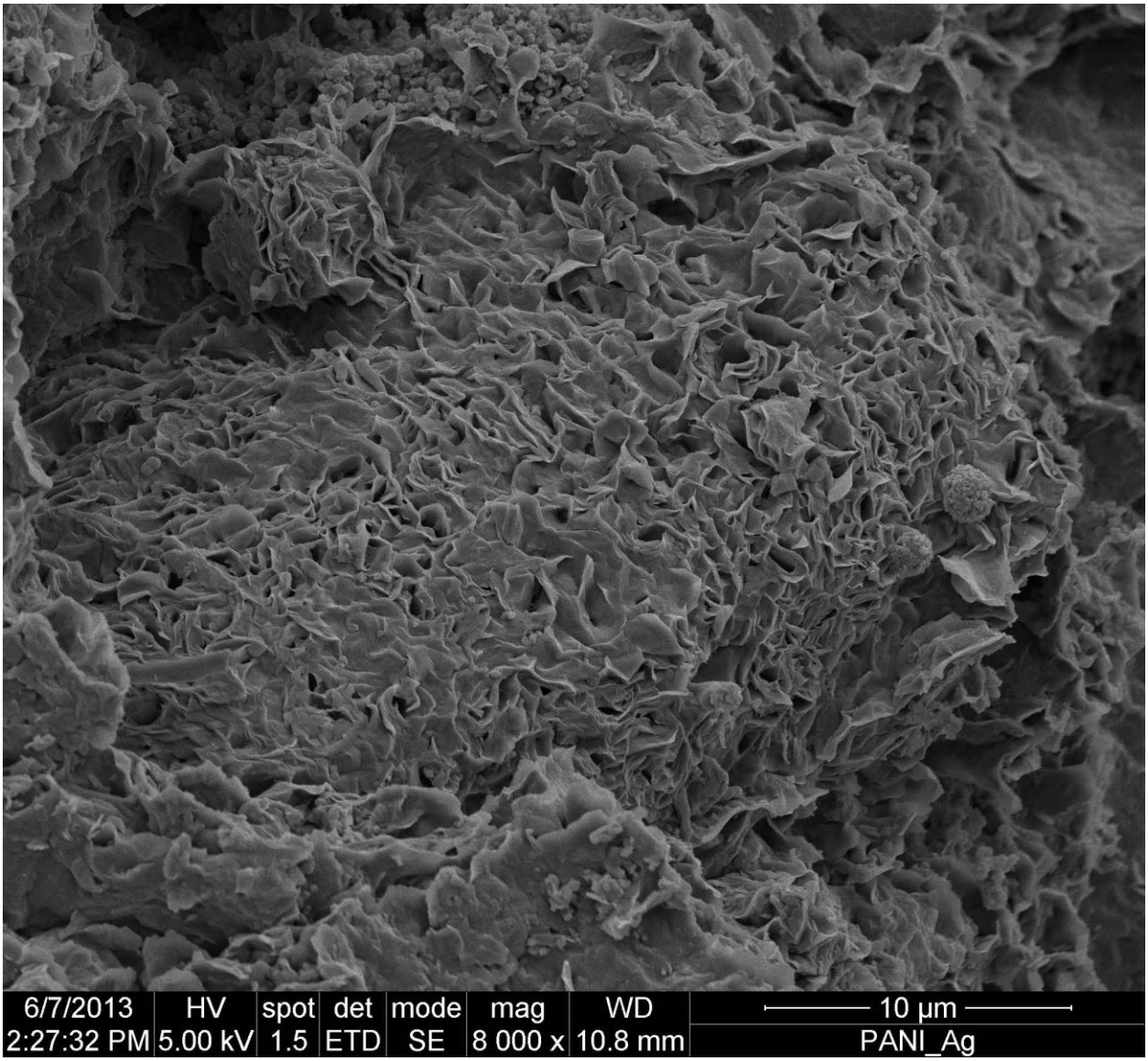
A.12-12: SEM image of Analcime (?) from EBS 12



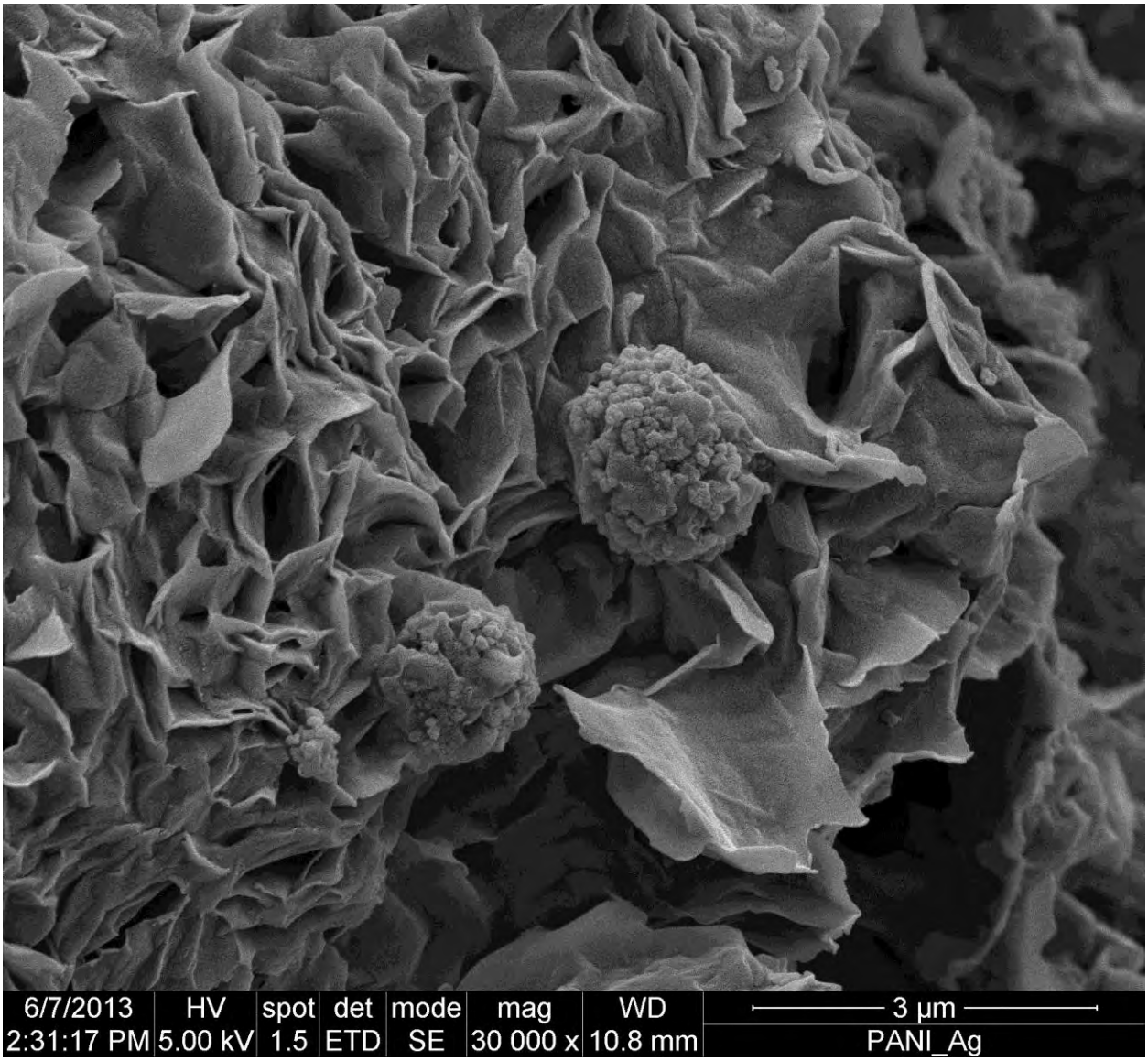
A.12-13: SEM image of dissolving Clinoptilolite from EBS 12



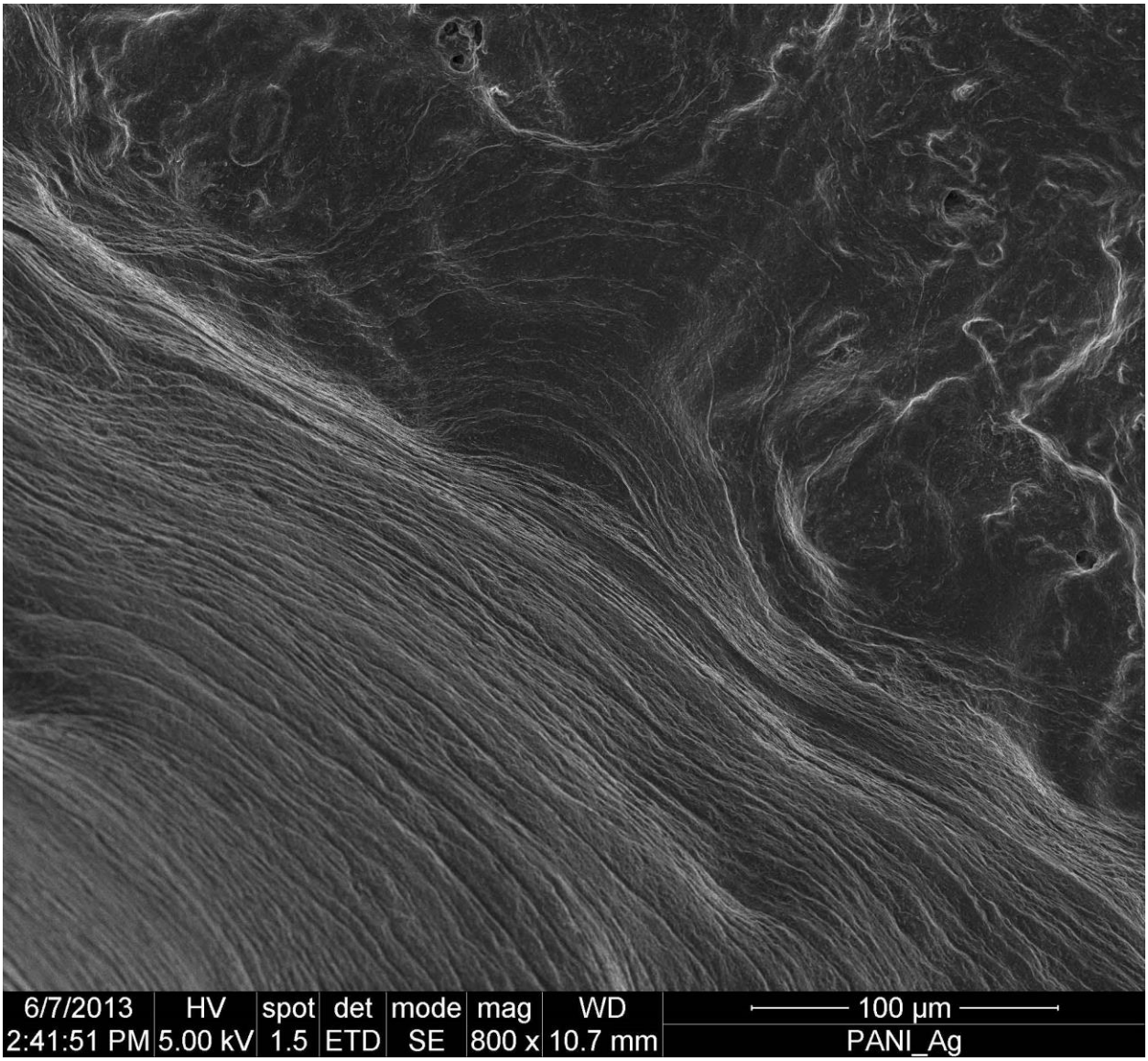
A.12-14: SEM image of foliated smectite structures in EBS-12



A.12-15: SEM image of smectite, amorphous SiO_2 (top) and Analcime (right)



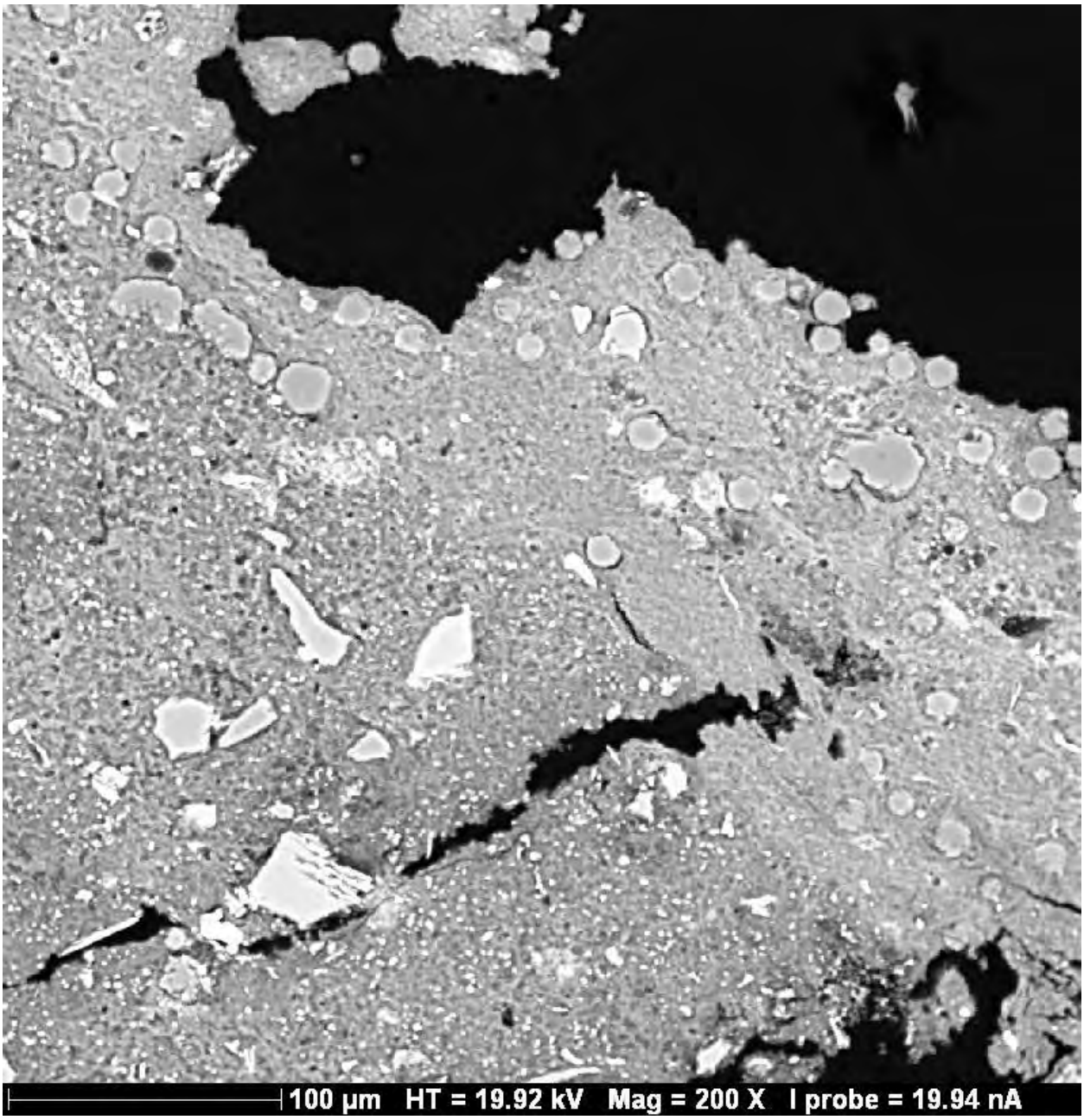
A.12-16: SEM image of Analcime on smectite



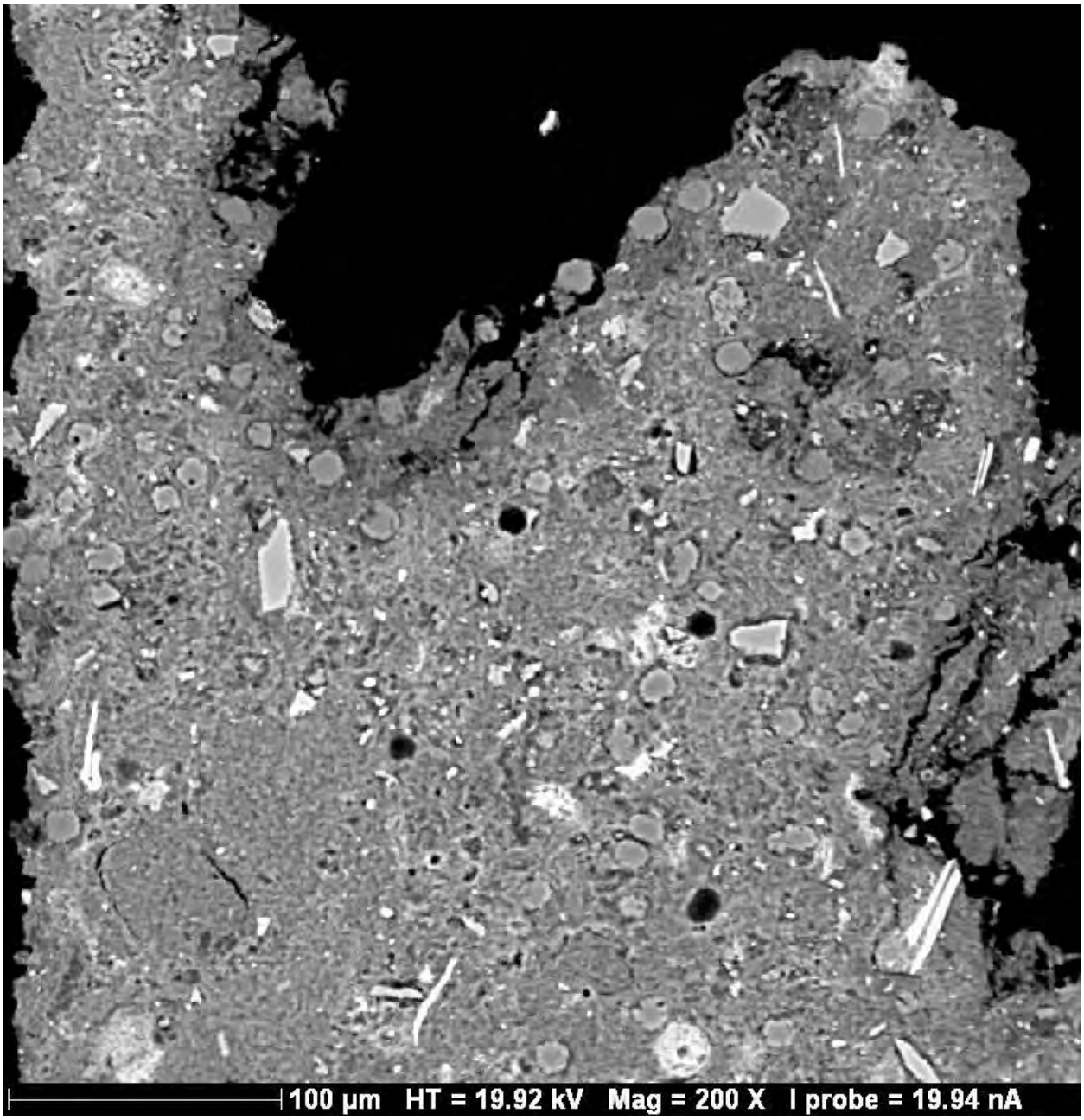
A.12-17: SEM image of compact bentonite structure in EBS 12

Appendix A.13

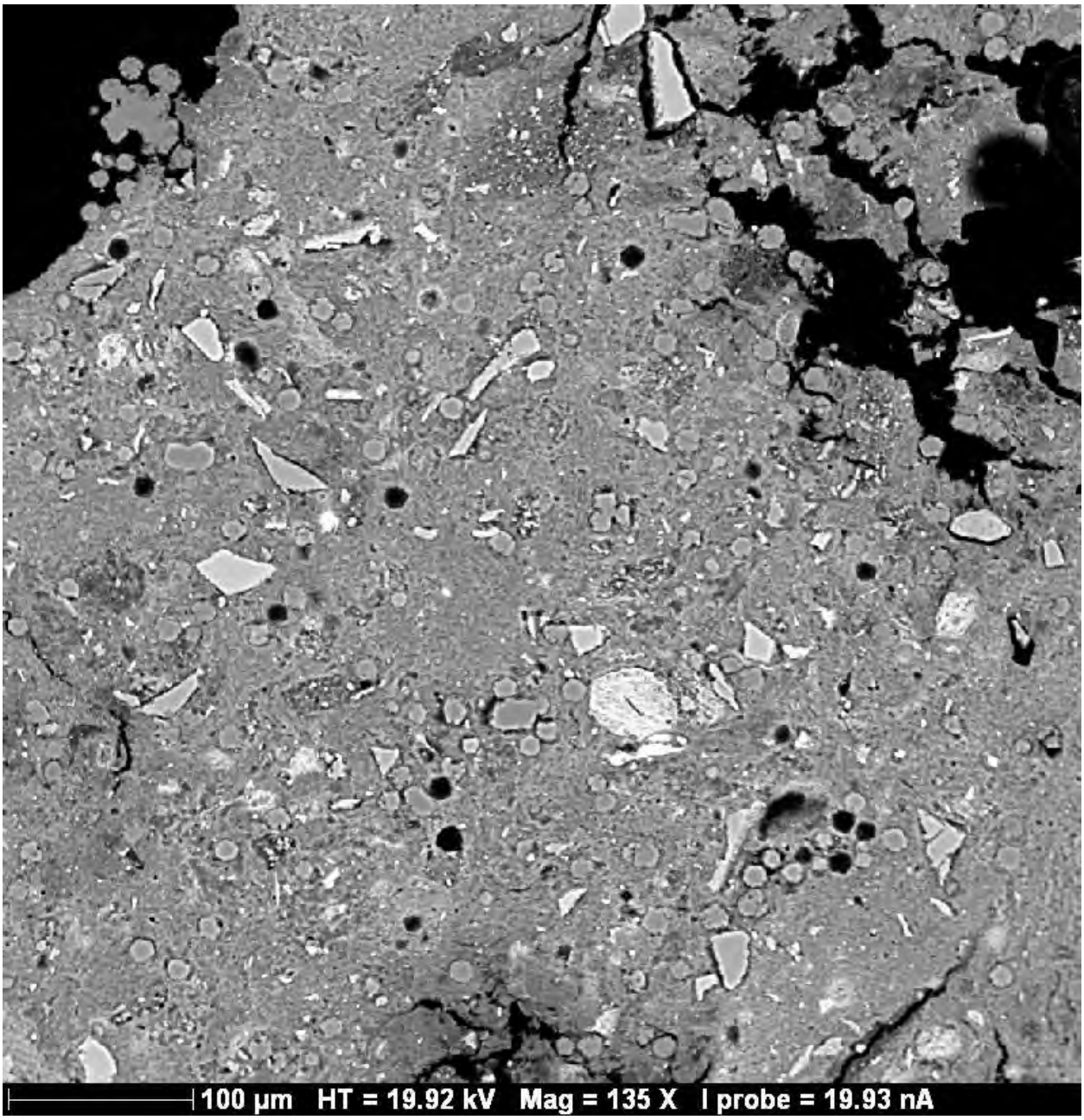
EBS 13 Temperature reduction from 300°C to 120°C and 150 bar for 6 months run with 316 Stainless Steel



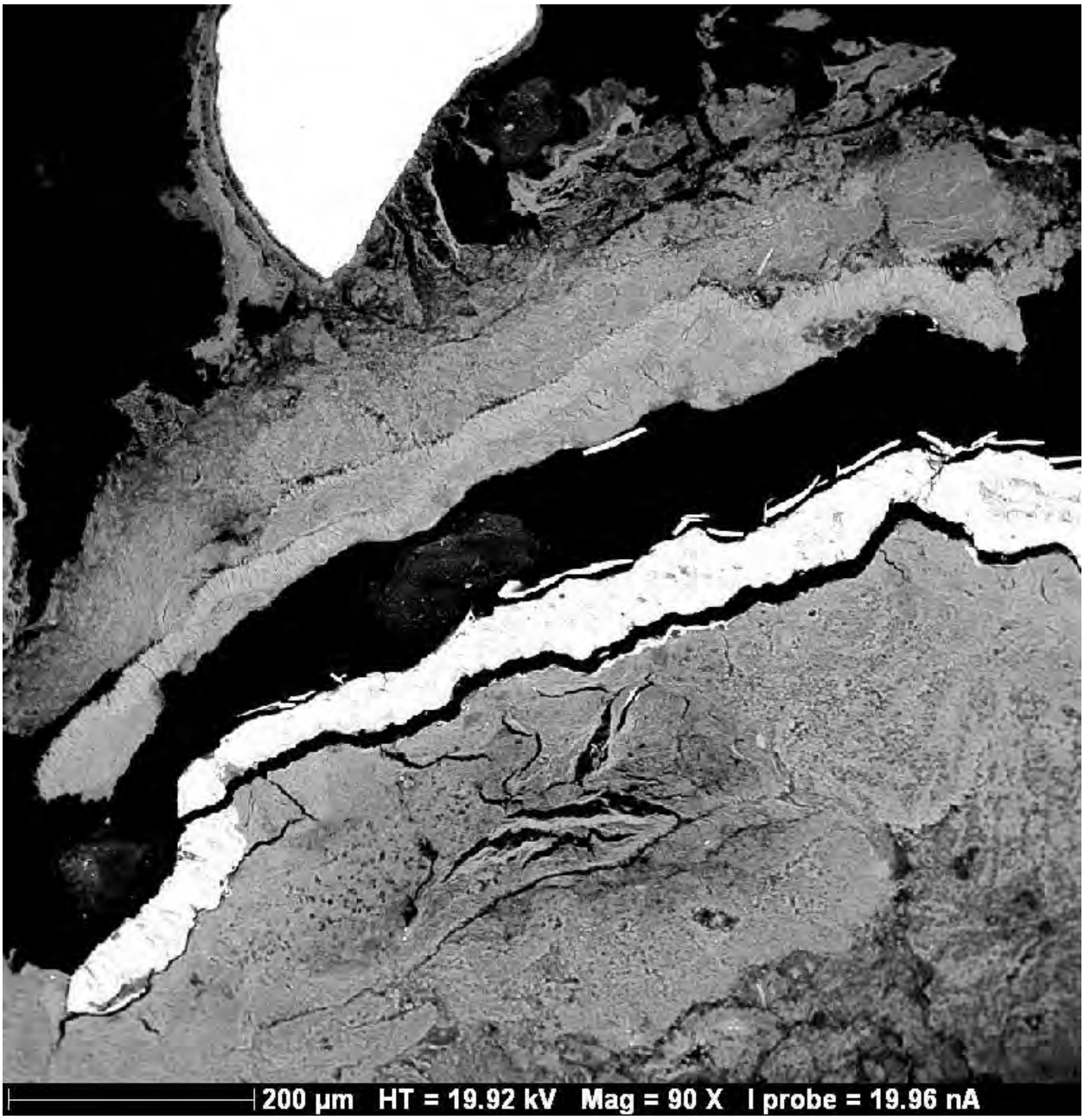
A.13-1: SEM image of EBS 13 thin section. Note analcime crystals



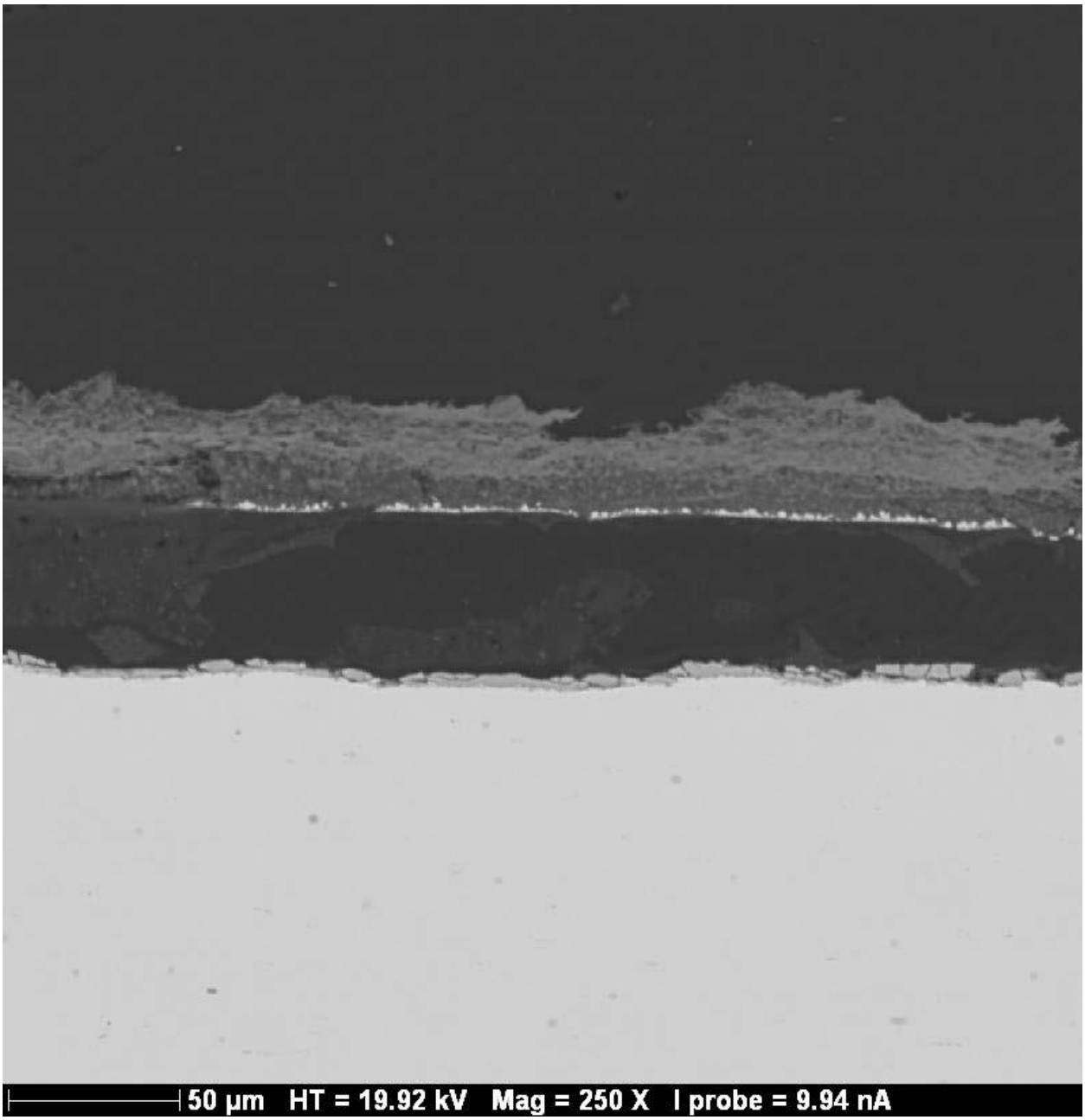
A.13-2: SEM image of EBS 13 thin section. Note analcime crystals



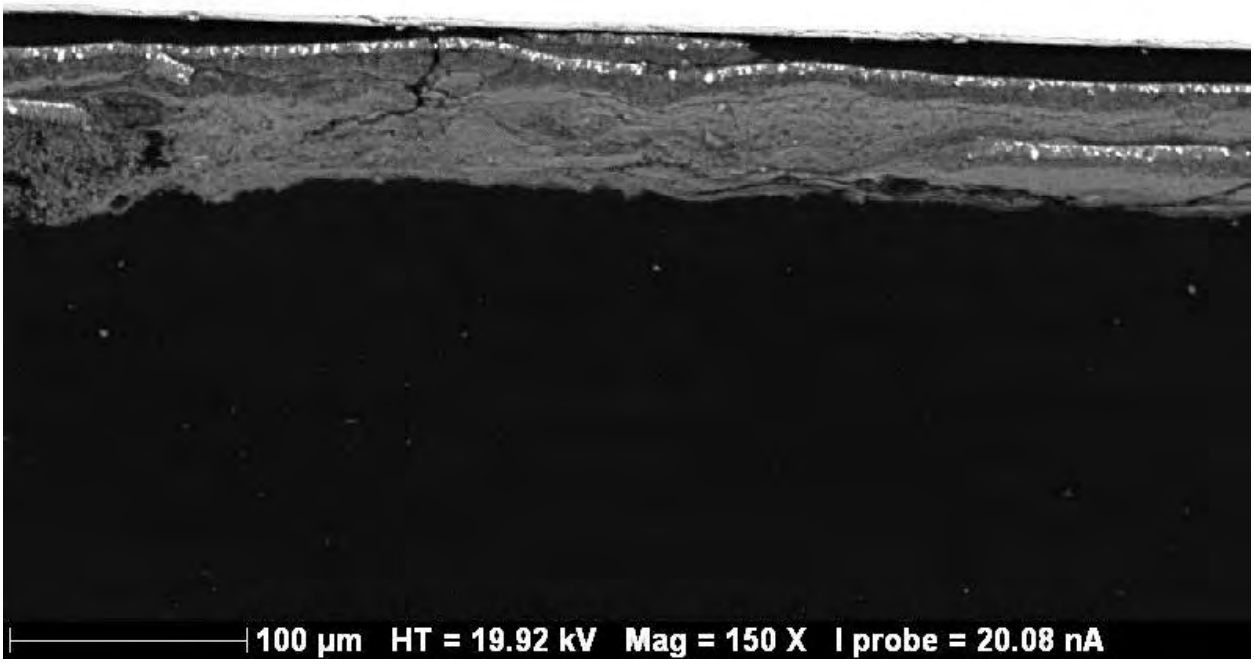
A.13-3: SEM image of EBS 13 thin section. Note analcime crystals



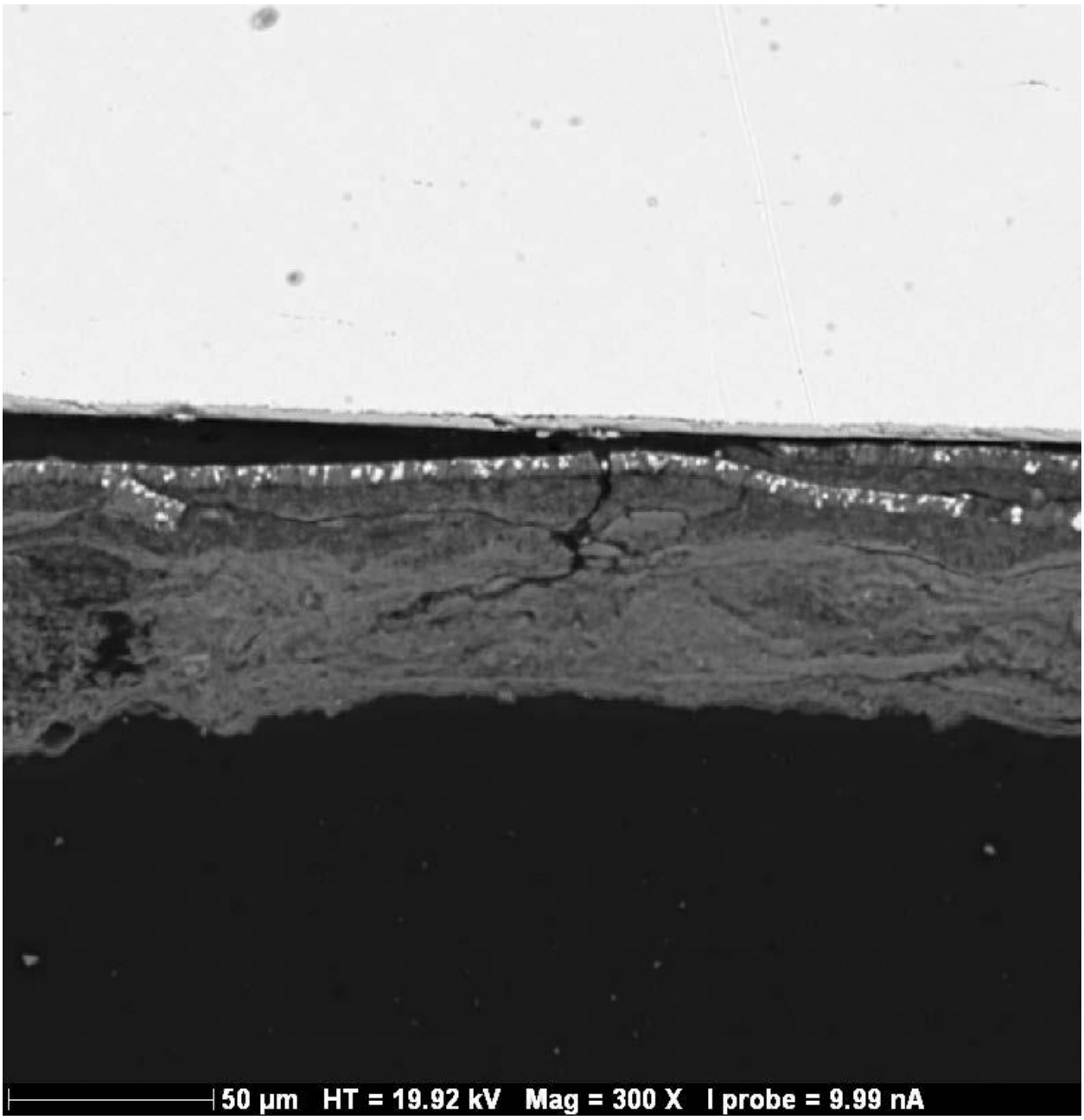
A.13-4: SEM image of EBS 13 thin section. Note Fe-phyllosilicates around native iron



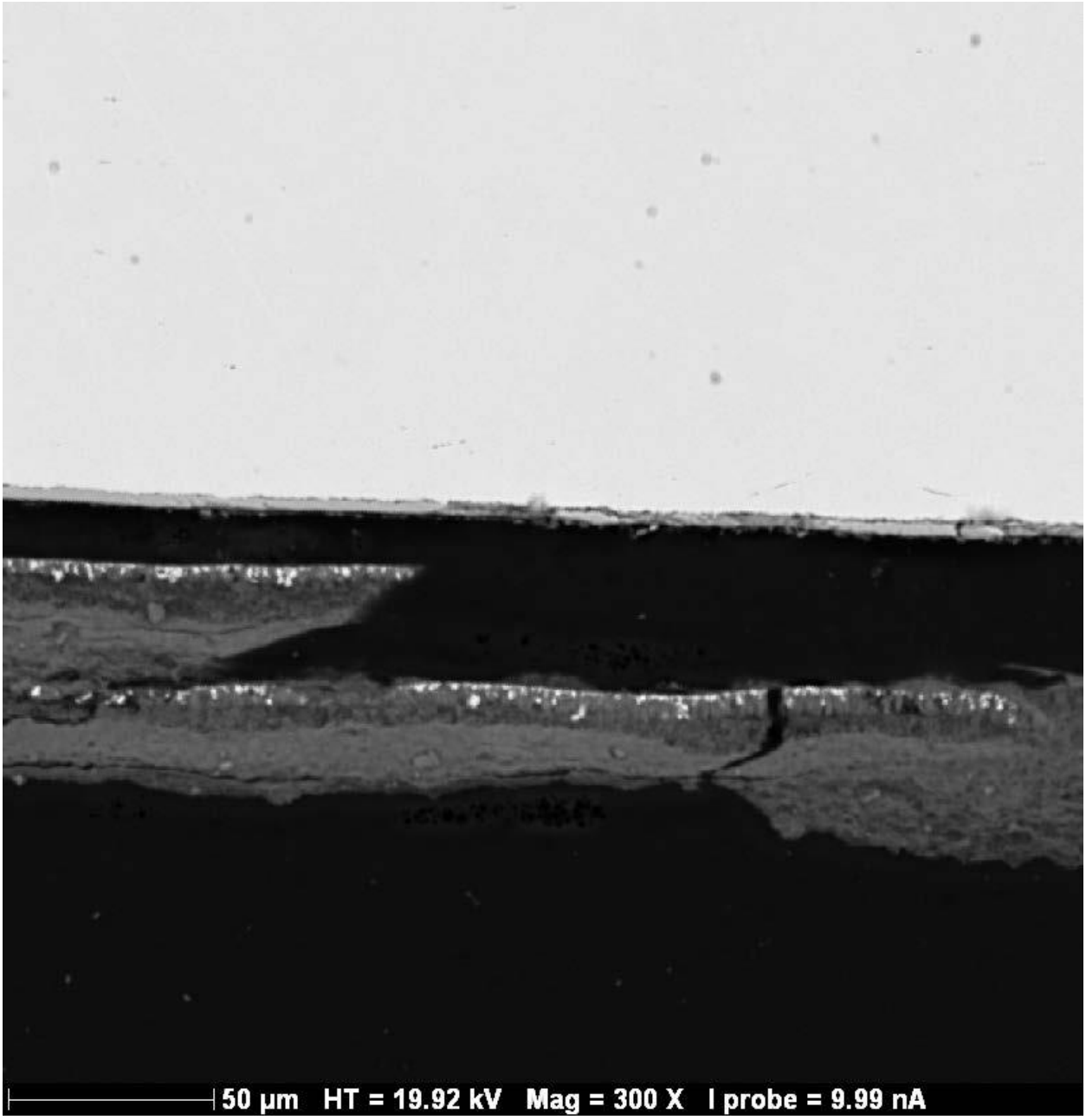
A.13-5: SEM image of EBS 13 stainless steel cross section



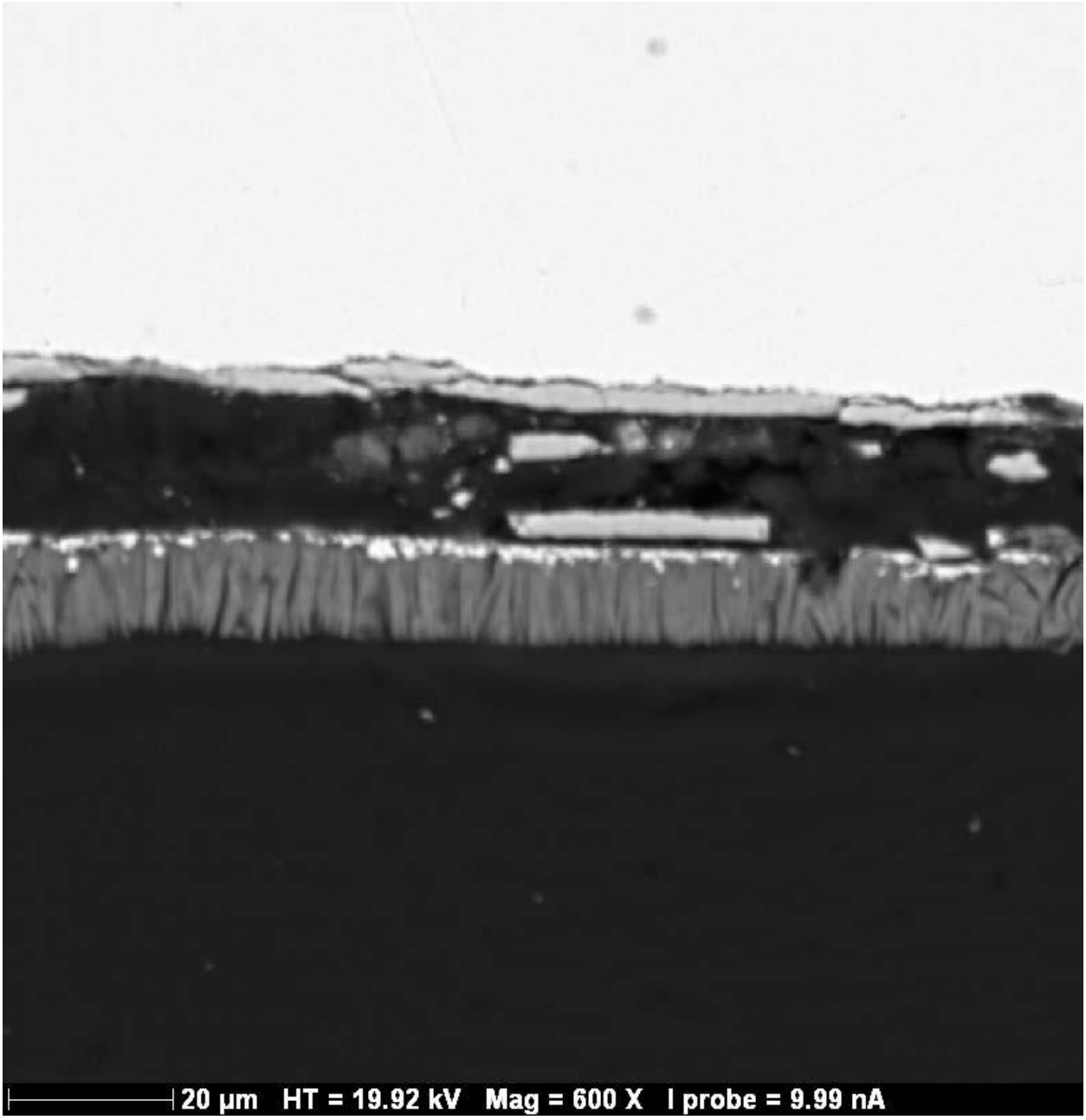
A.13-6: SEM image of stainless steel, epoxy, chromite, saponite and chlorite cross section from EBS 13



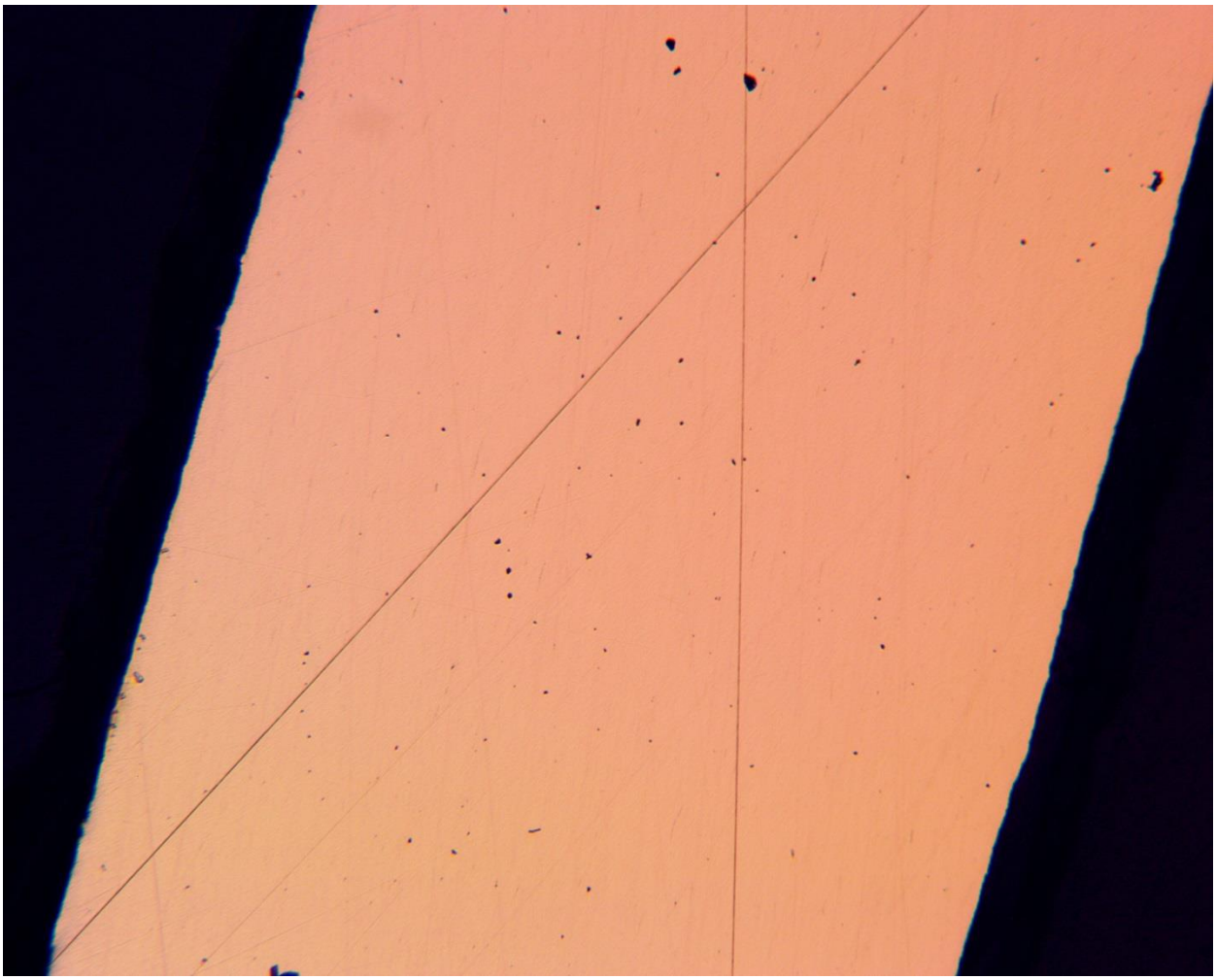
A.13-7: SEM image of stainless steel, chromite and chlorite cross section from EBS 13



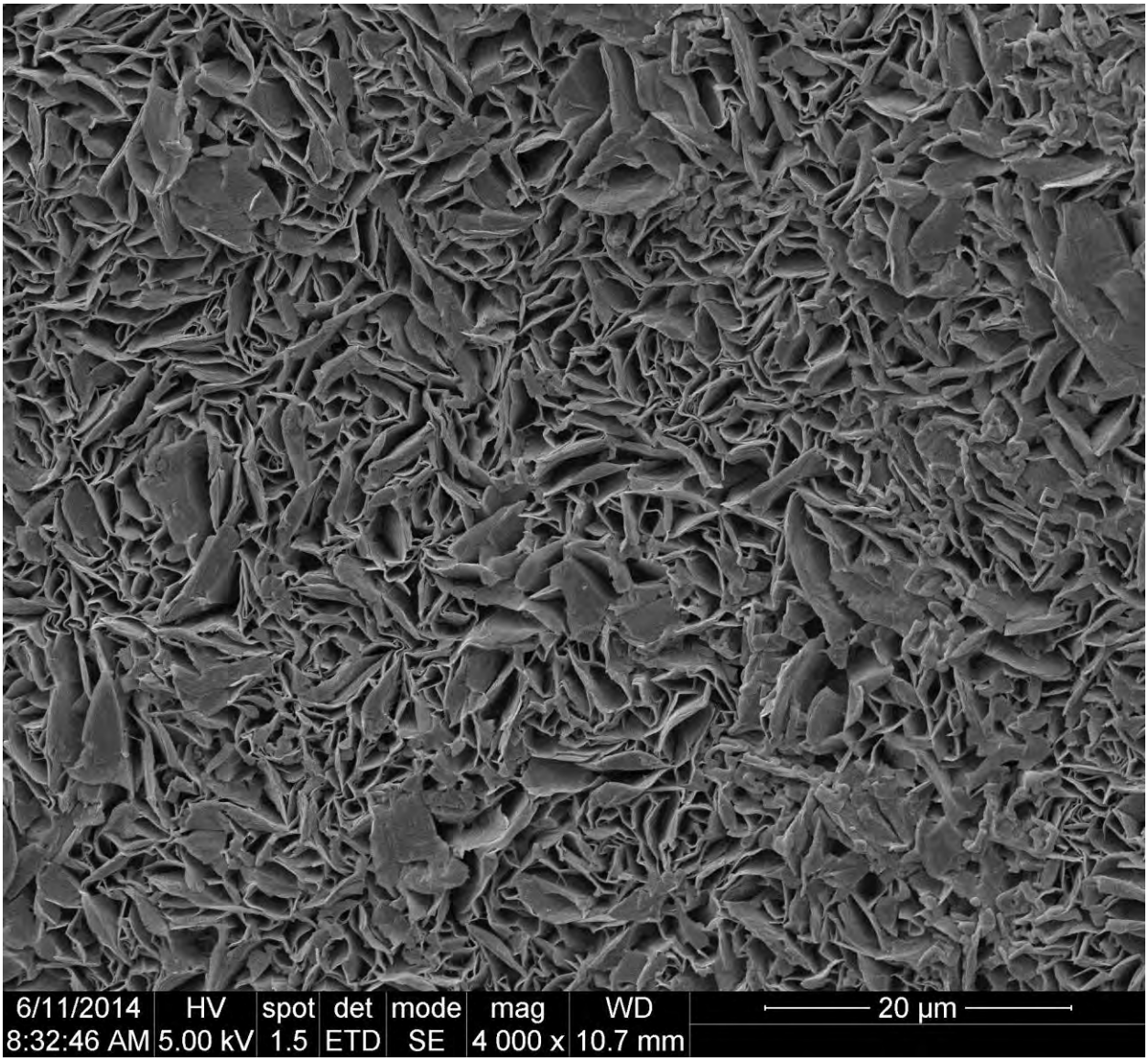
A.13-8: SEM image of EBS 13 cross section



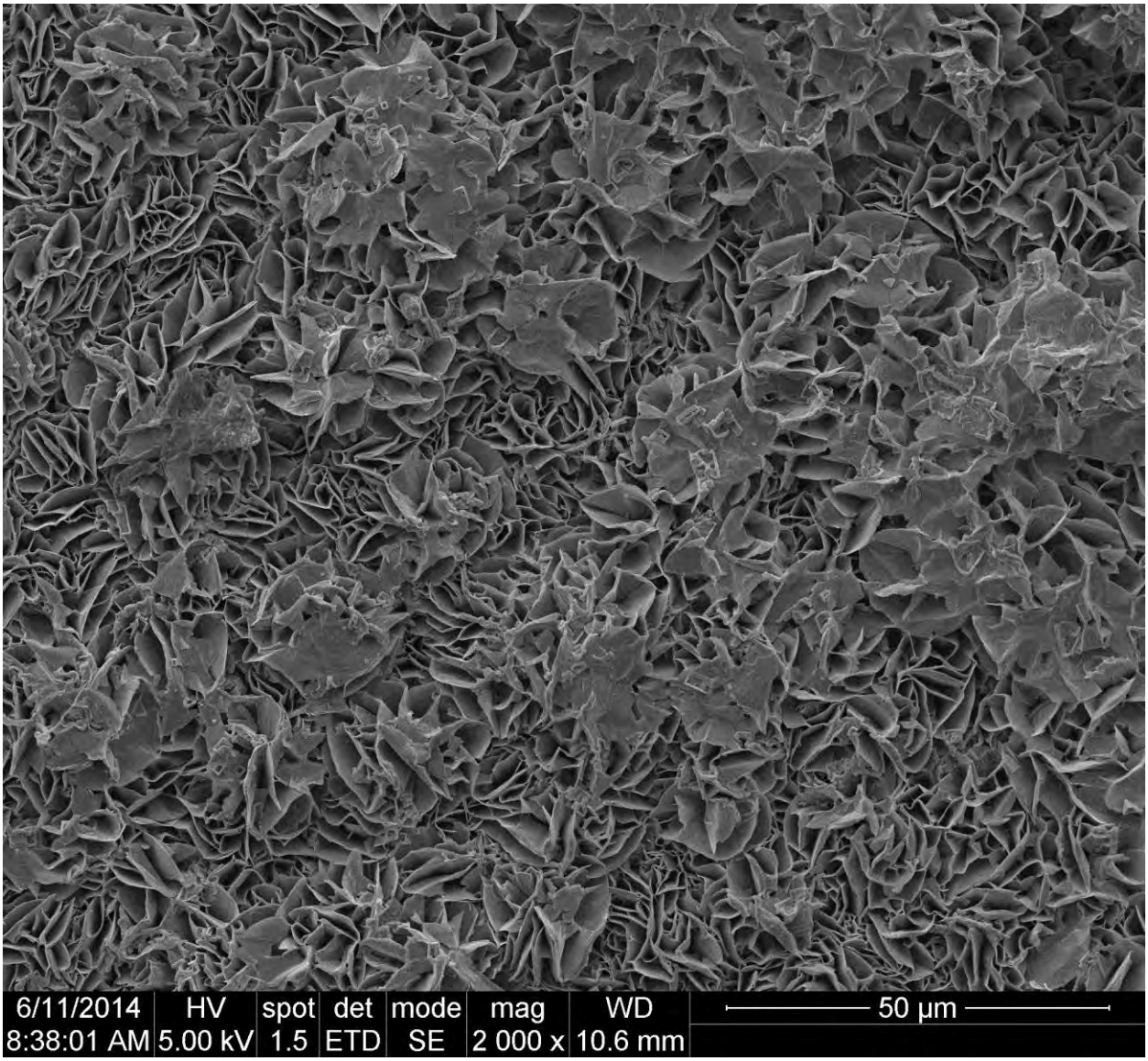
A.13-9: SEM image of iron saponite crystals perpendicular to stainless steel



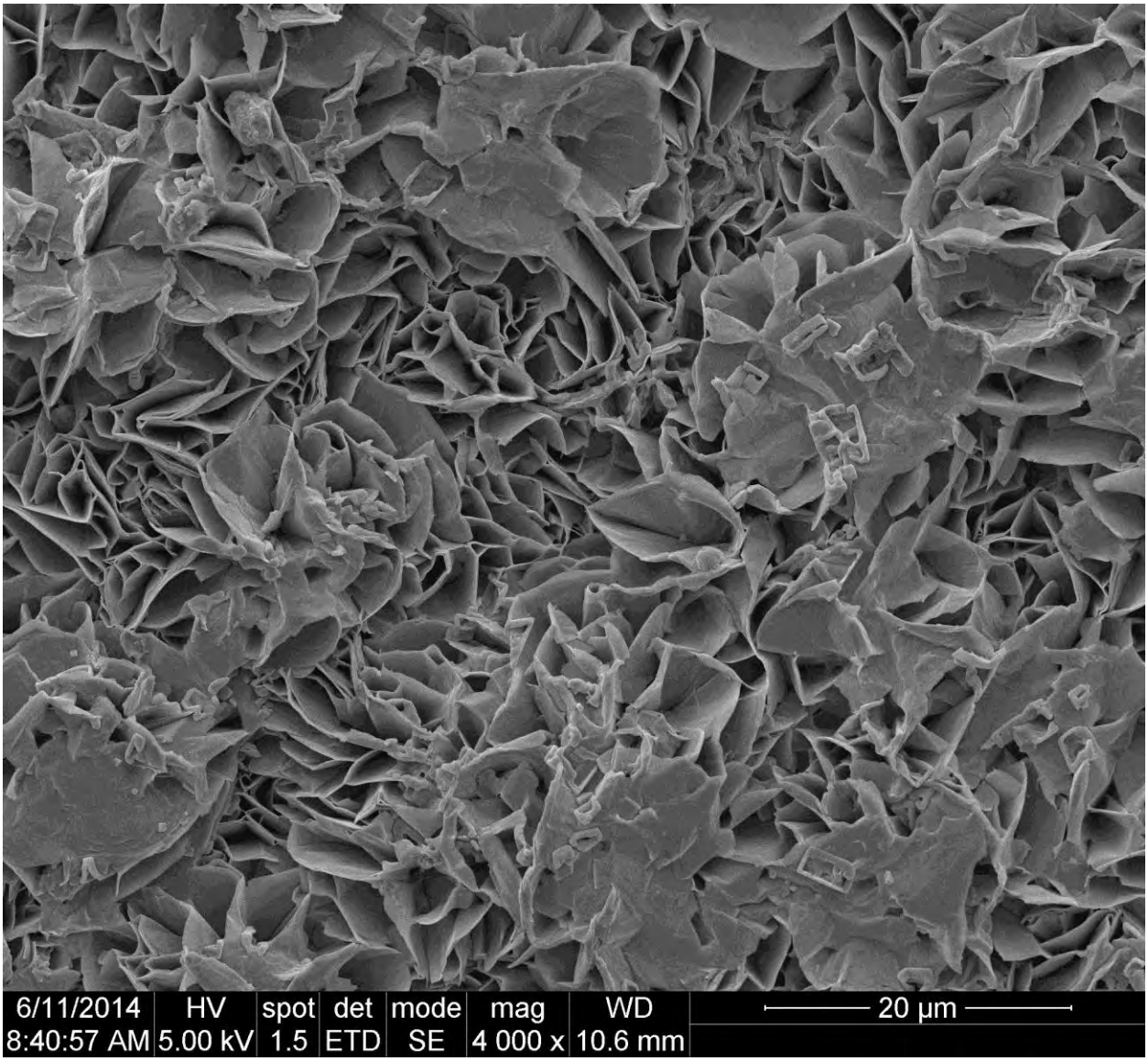
A.13-10 : SEM image non-corroded 316 Stainless Steel after reaction



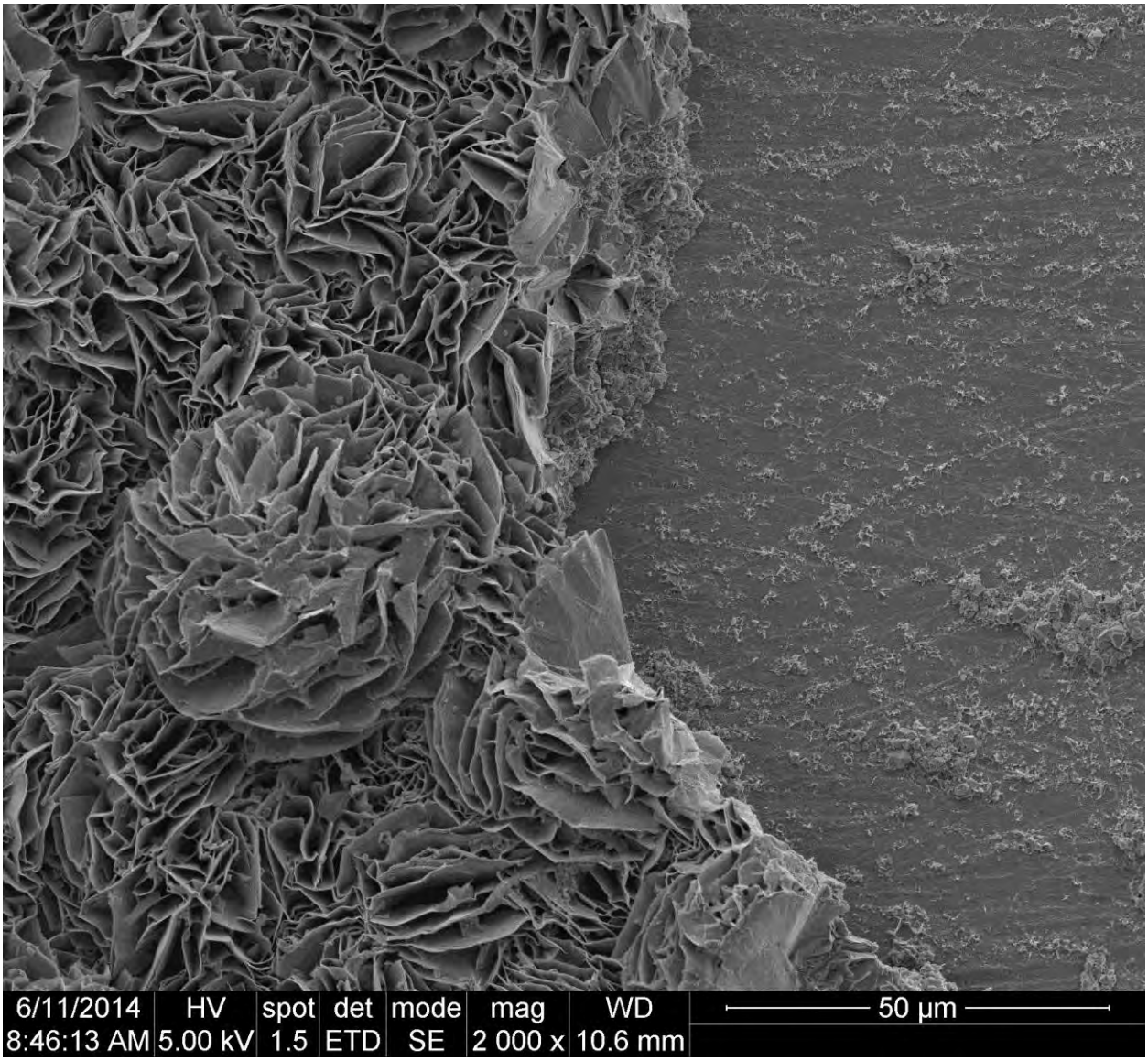
A.13-11. SEM image of extra-large and thicker saponite that previous examples



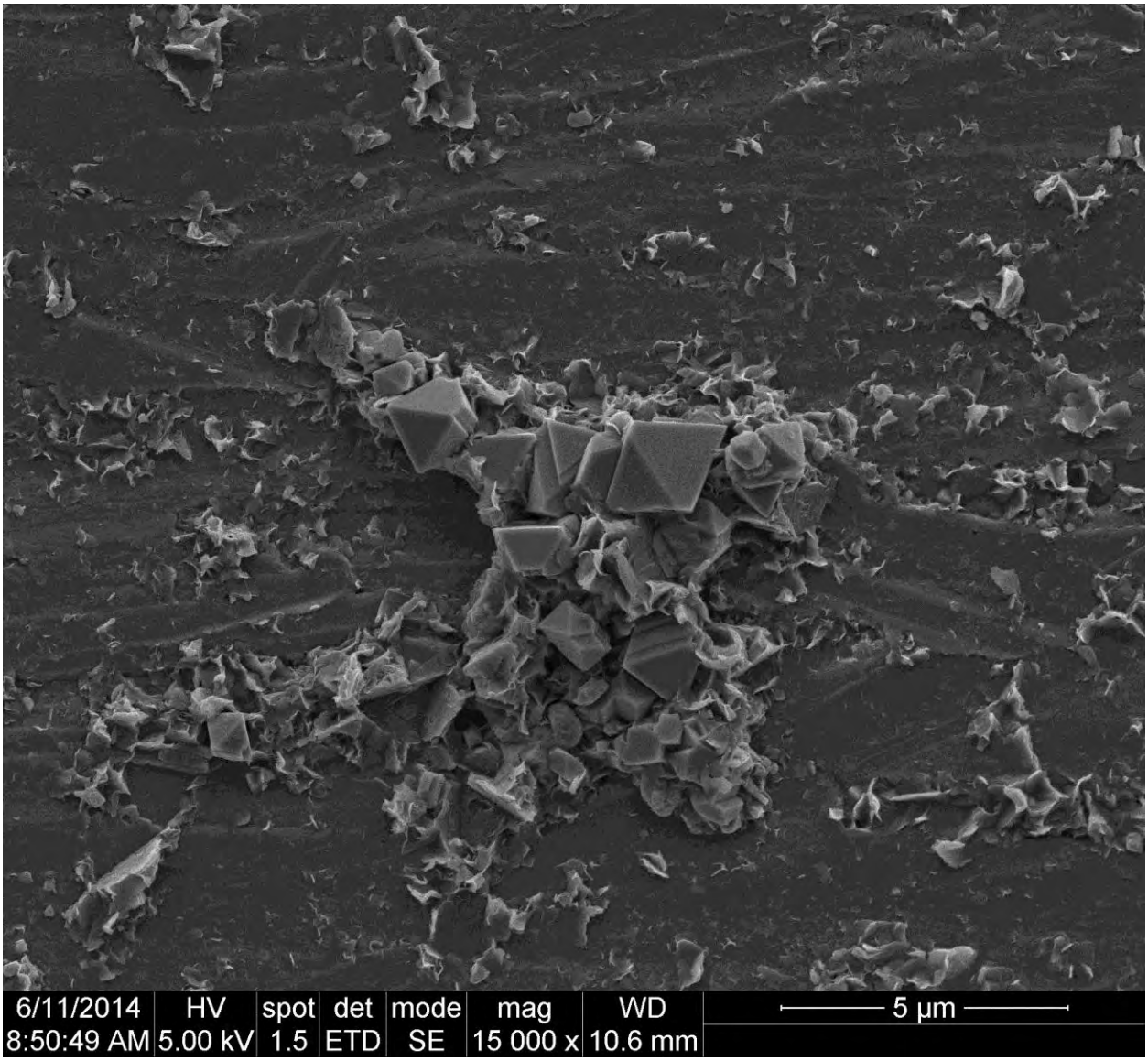
A.13-12: SEM image of saponite with secondary rosettes from EBS 13



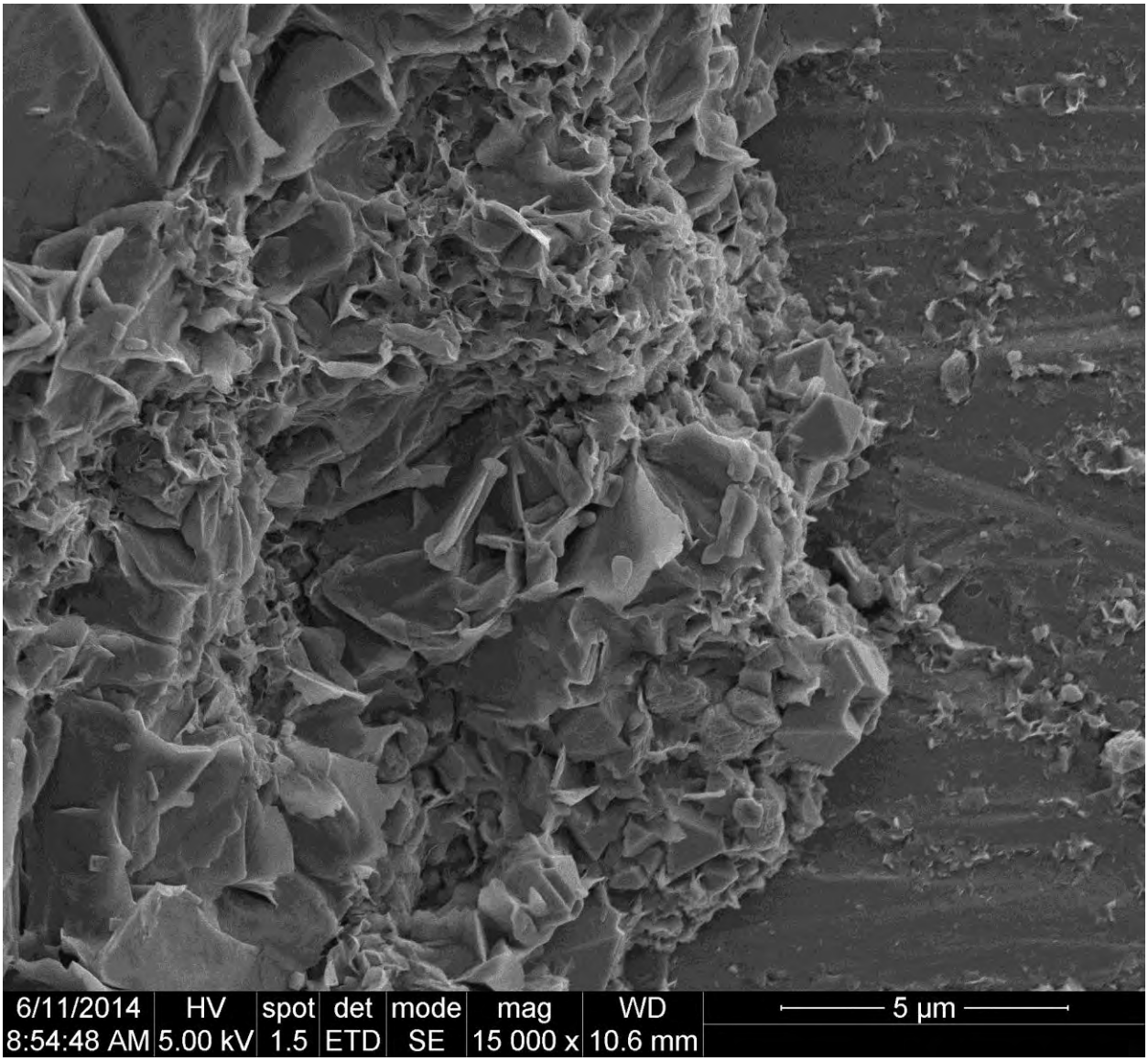
A.13-13: Close up SEM image of saponite with secondary rosettes from EBS 13



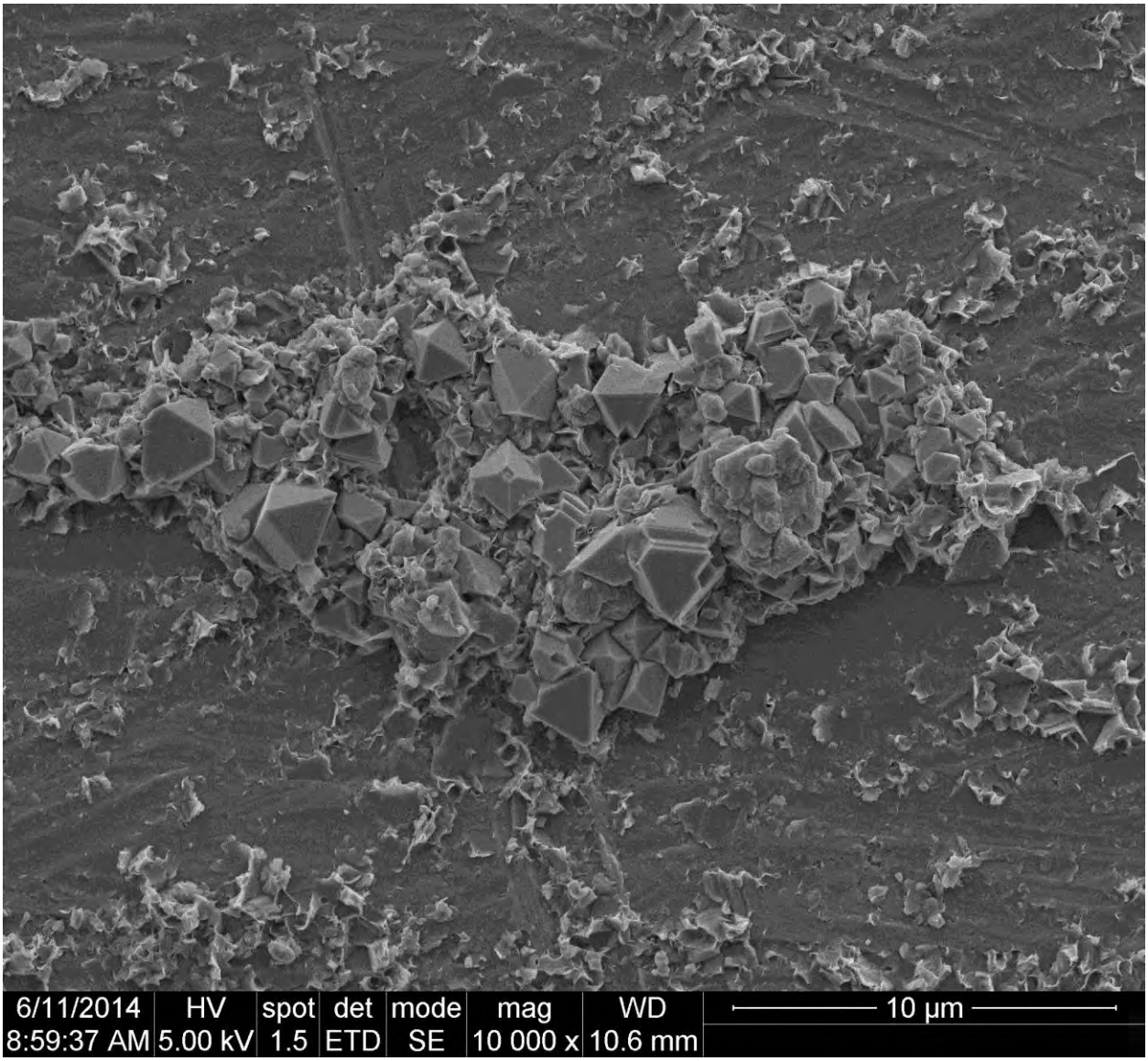
A.13-14: SEM image of saponite on stainless steel surface



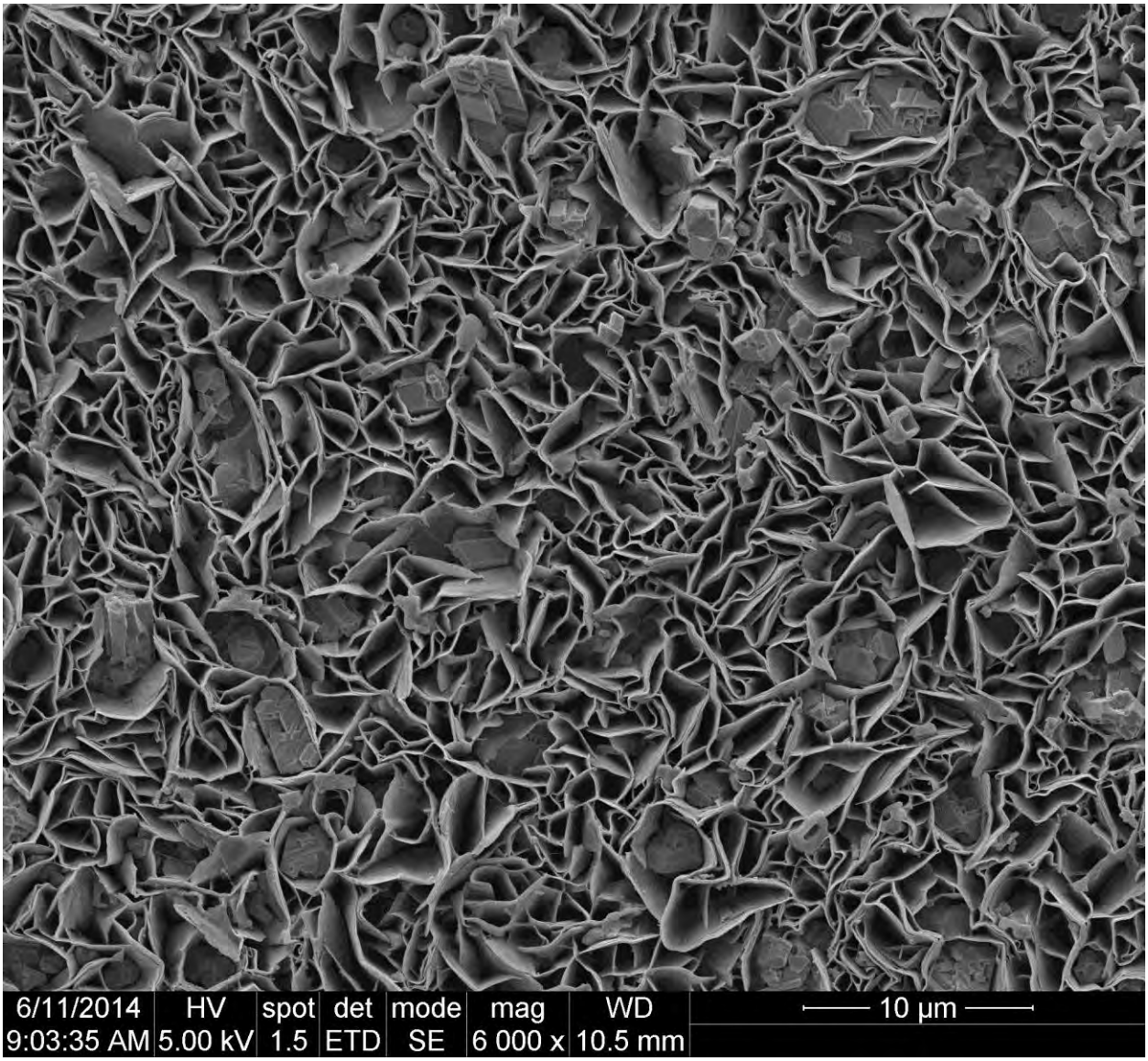
A.13-15: SEM image of extra-large chromite on stainless steel from EBS 13



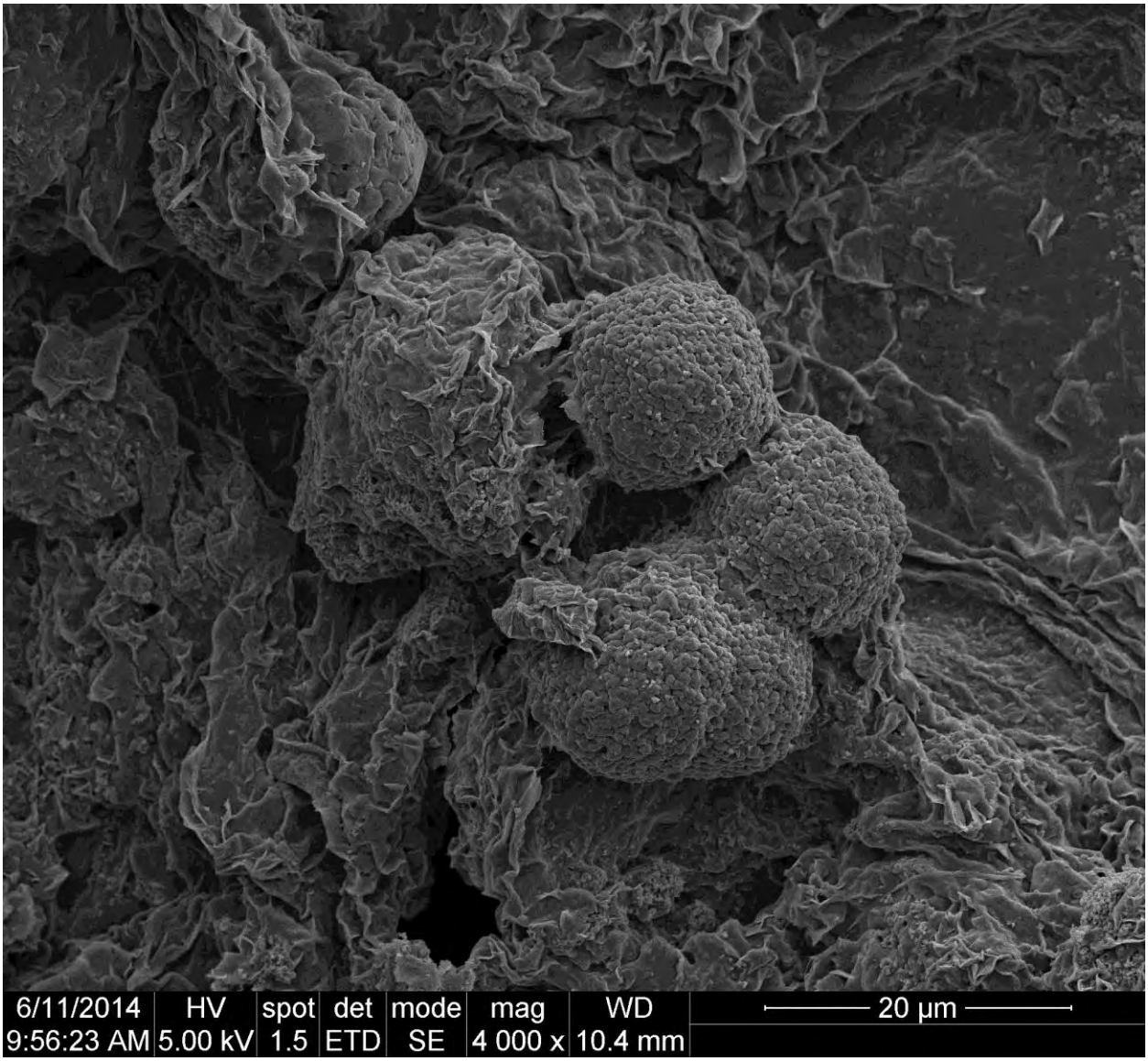
A.13-16. SEM image of chromite embedded in Saponite on stainless steel surface from EBS 13



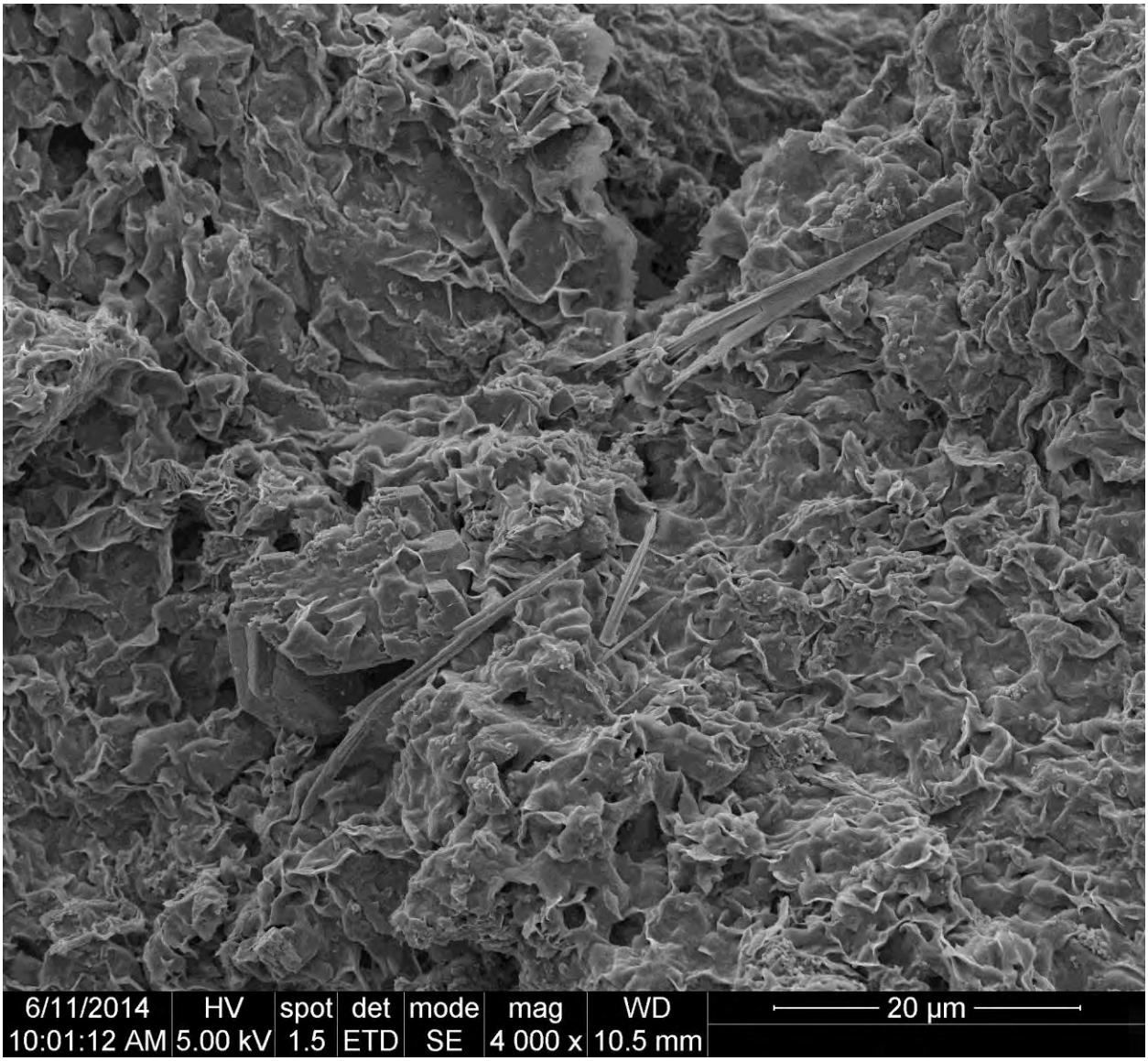
A.13-17. SEM image of Chromite clot on stainless steel surface from EBS 13



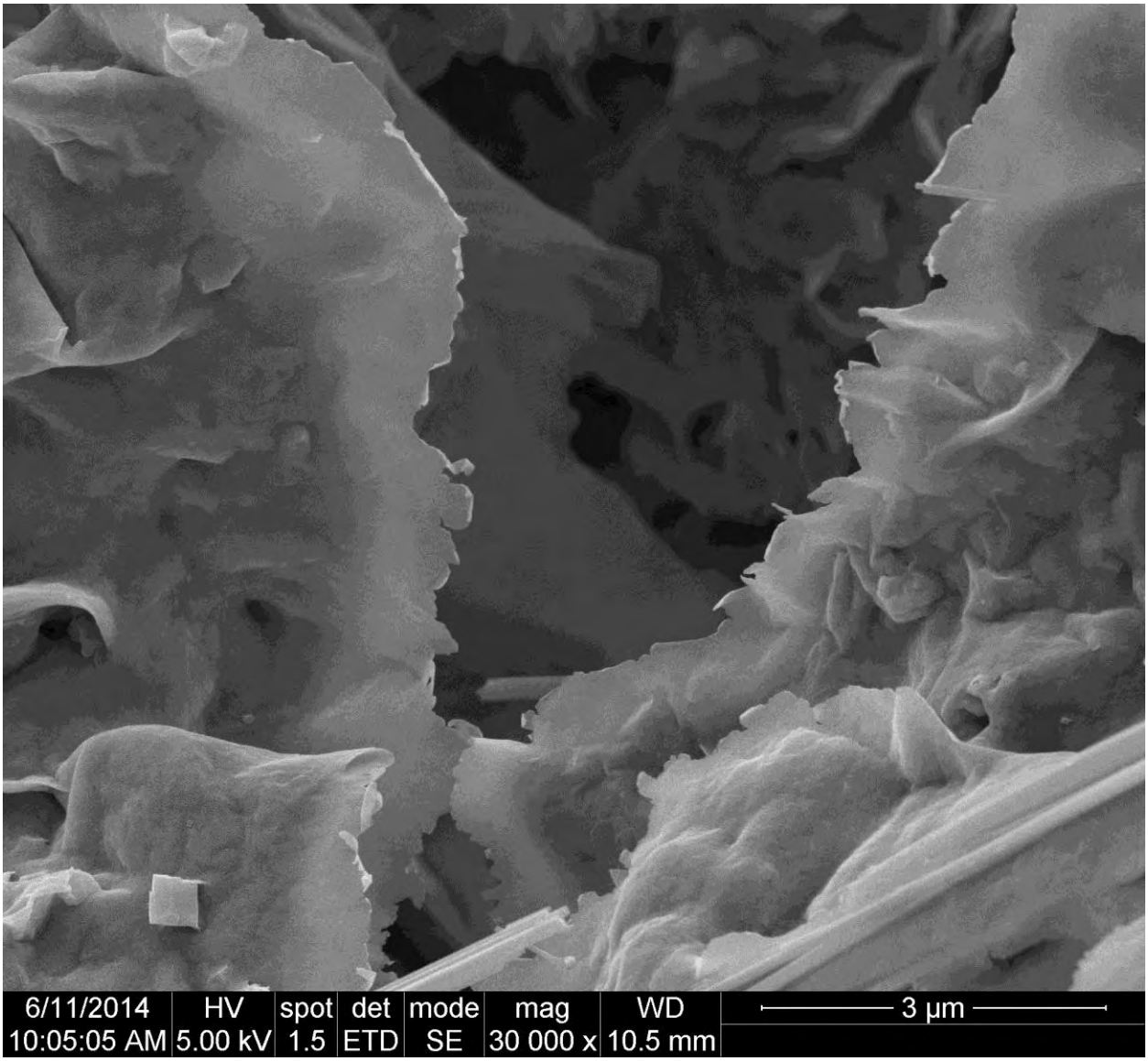
A.13-18: SEM image of Pentlandite growing through saponite mat from EBS 13



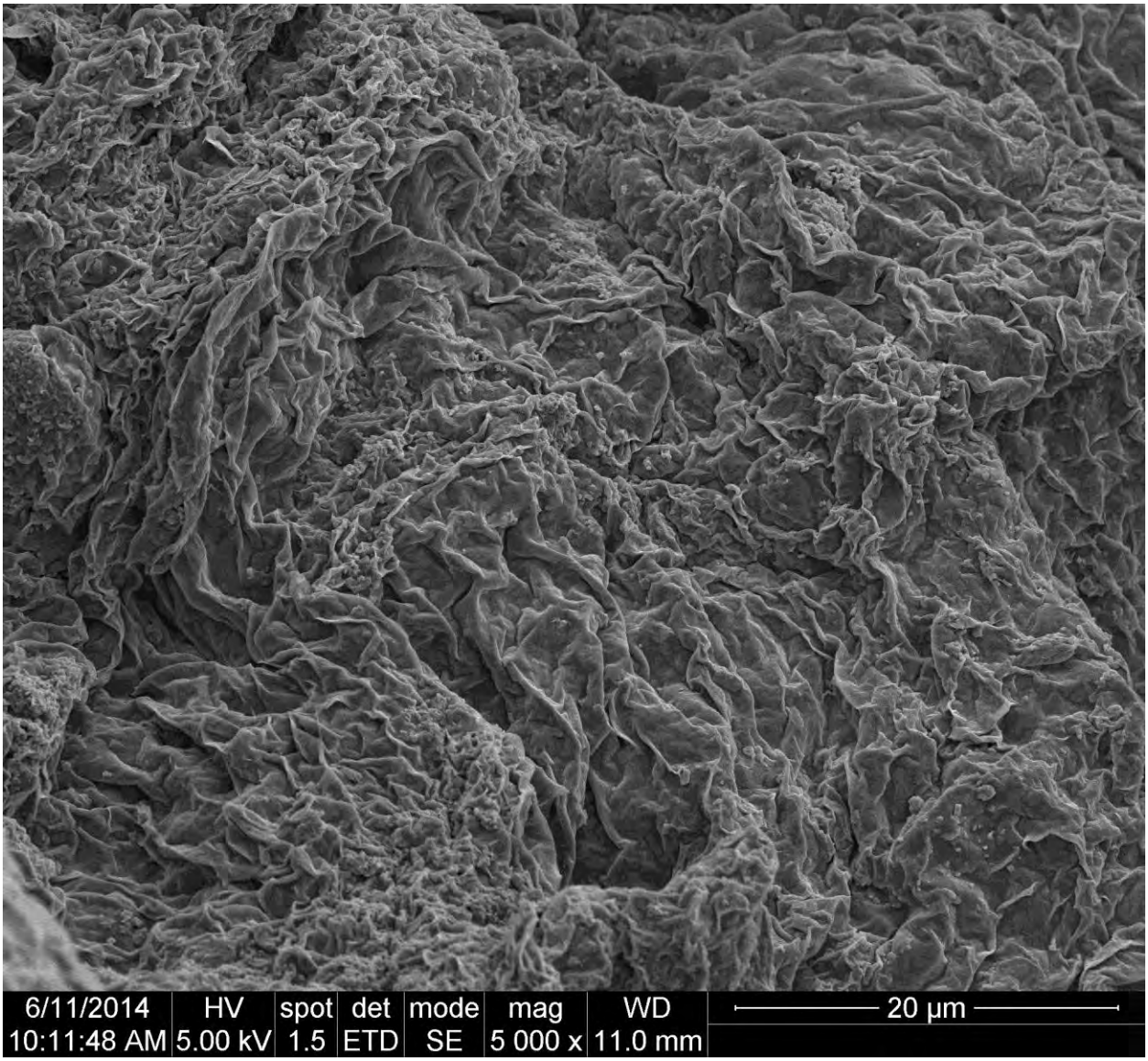
A.13-19. SEM image of smectite and Analcime from EBS 13



A.13-20. SEM image of foliated smectite and unknown fibers from EBS 13



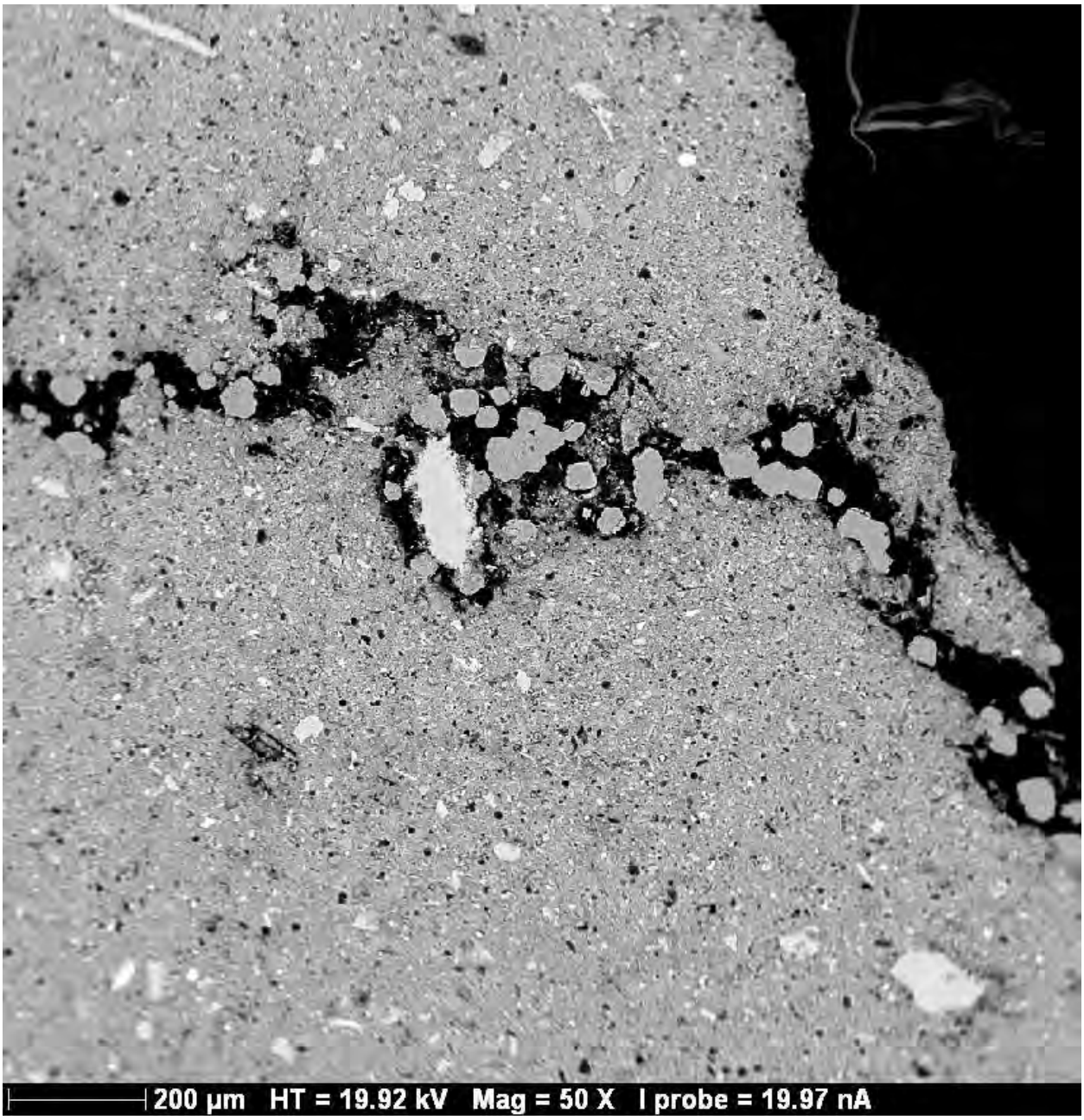
A.13-21: SEM image of dissolution of smectite grain edges from EBS 13



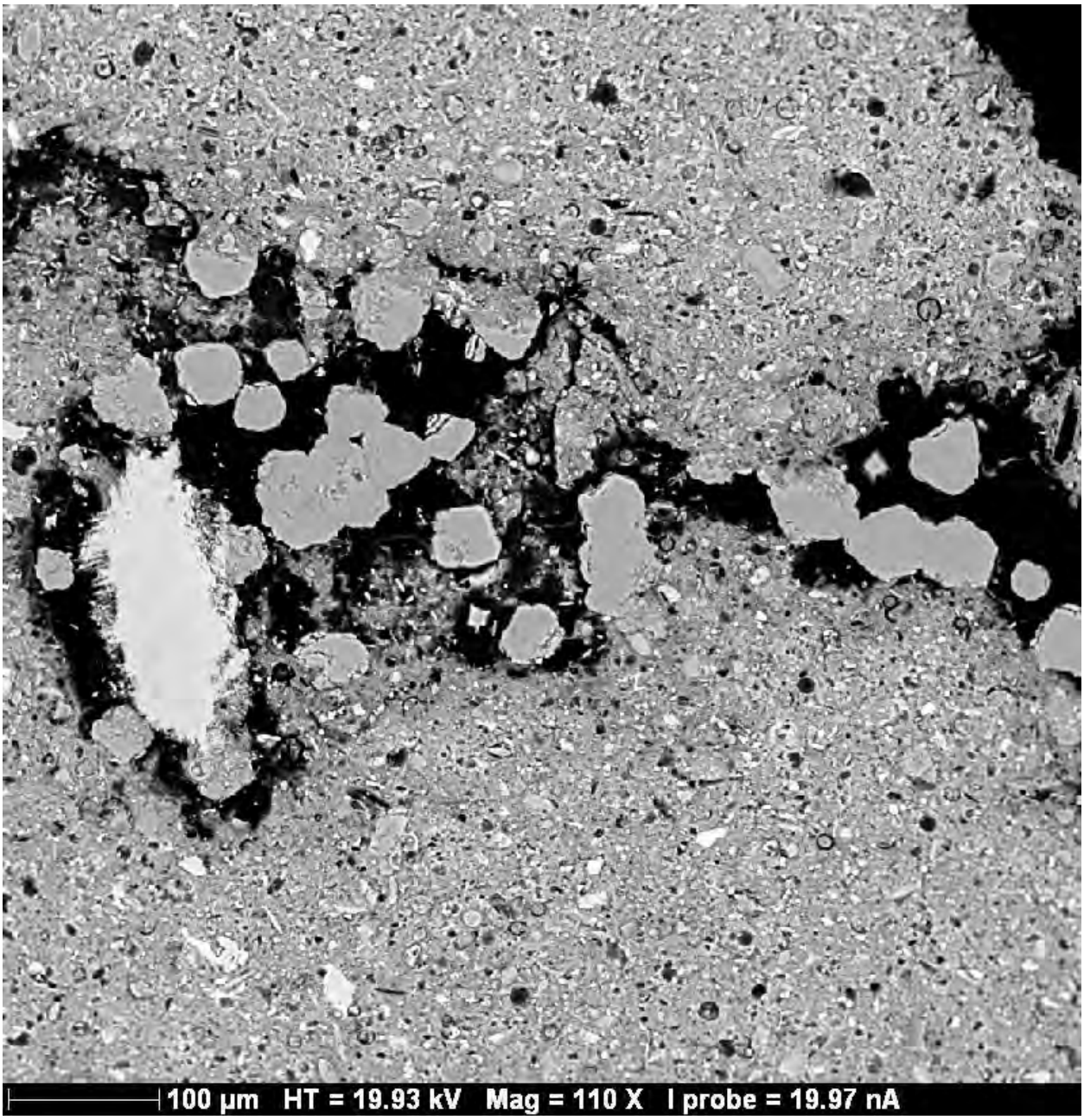
A.13-22.: SEM image of foliated smectite structures from EBS 13

Appendix A.14

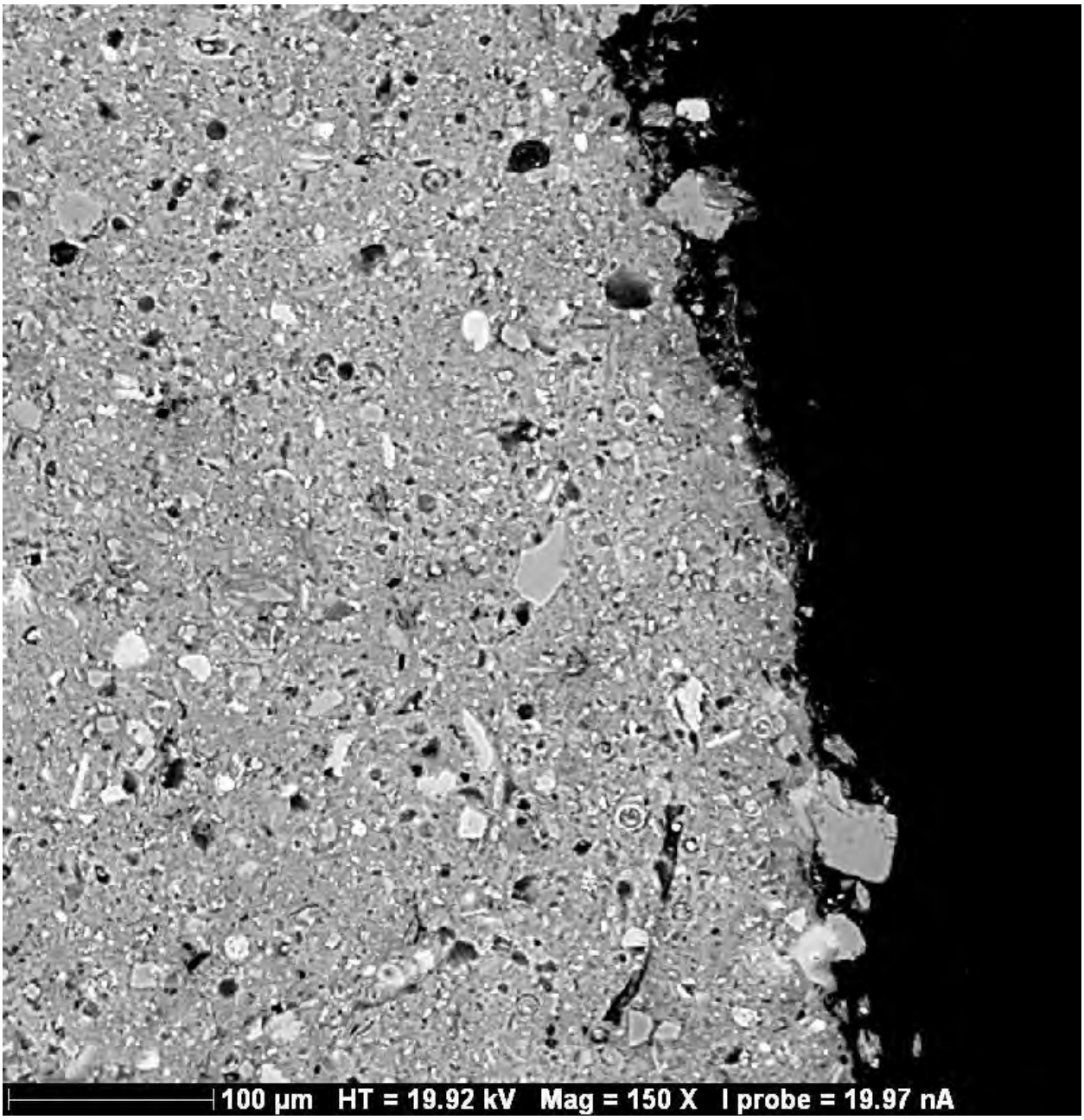
EBS-14 Isothermal at 300°C and 150 bar for 6 weeks run with Opalinus clay only



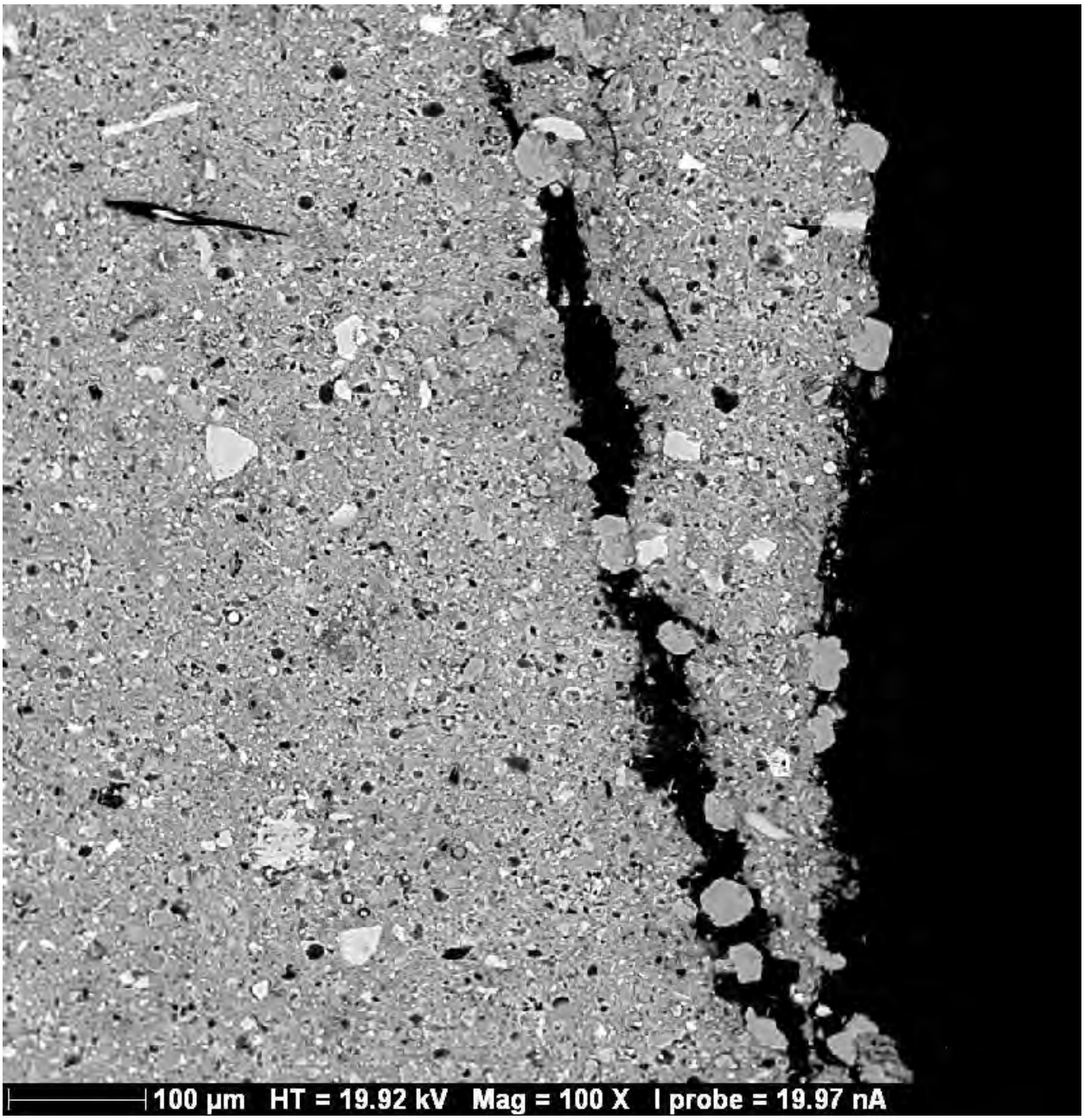
A.14-1. SEM image of large Wairakite crystals from EBS 14 thin section



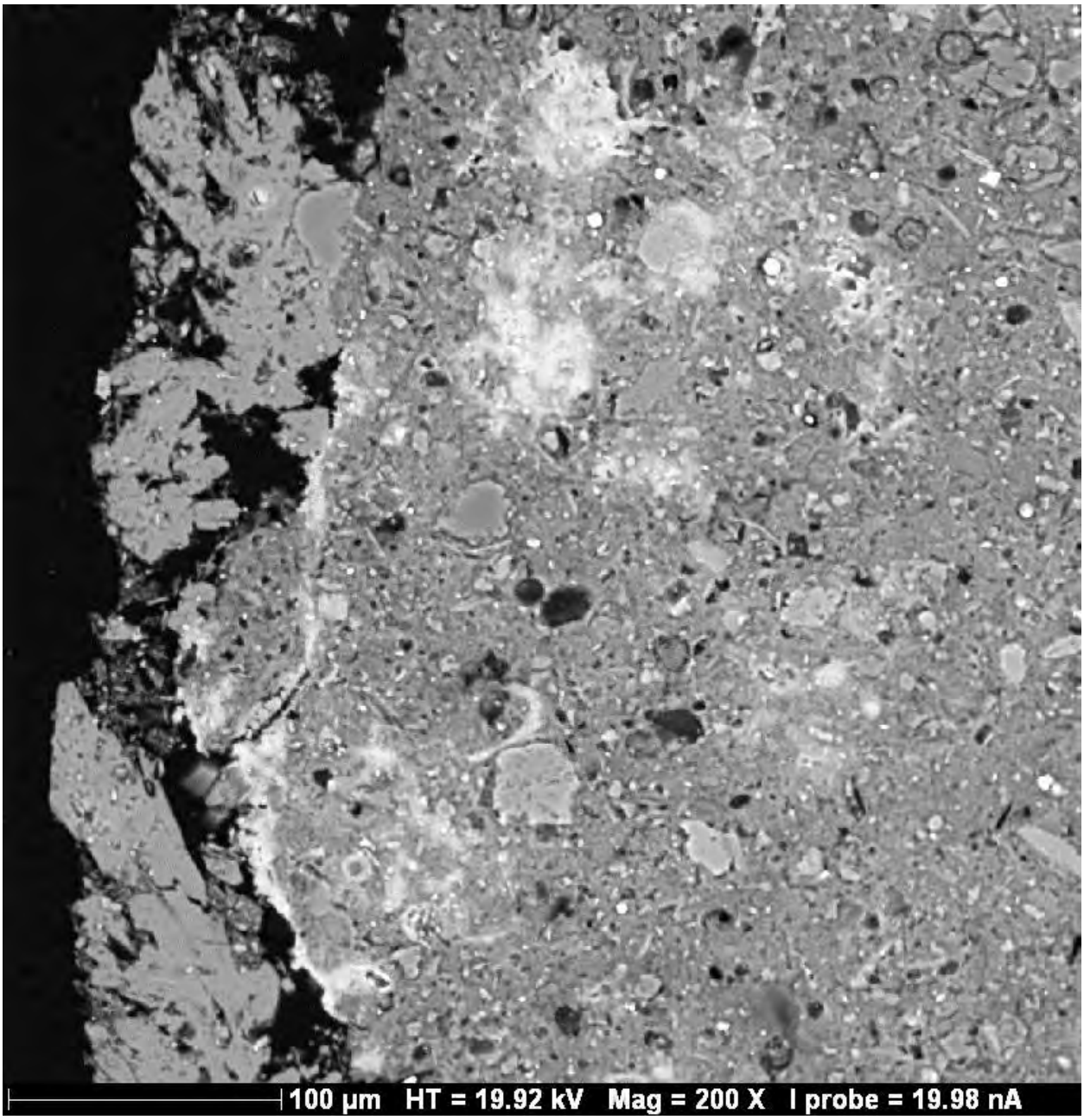
A.14-2. SEM image of Wairakite crystals in void from EBS 14 thin section



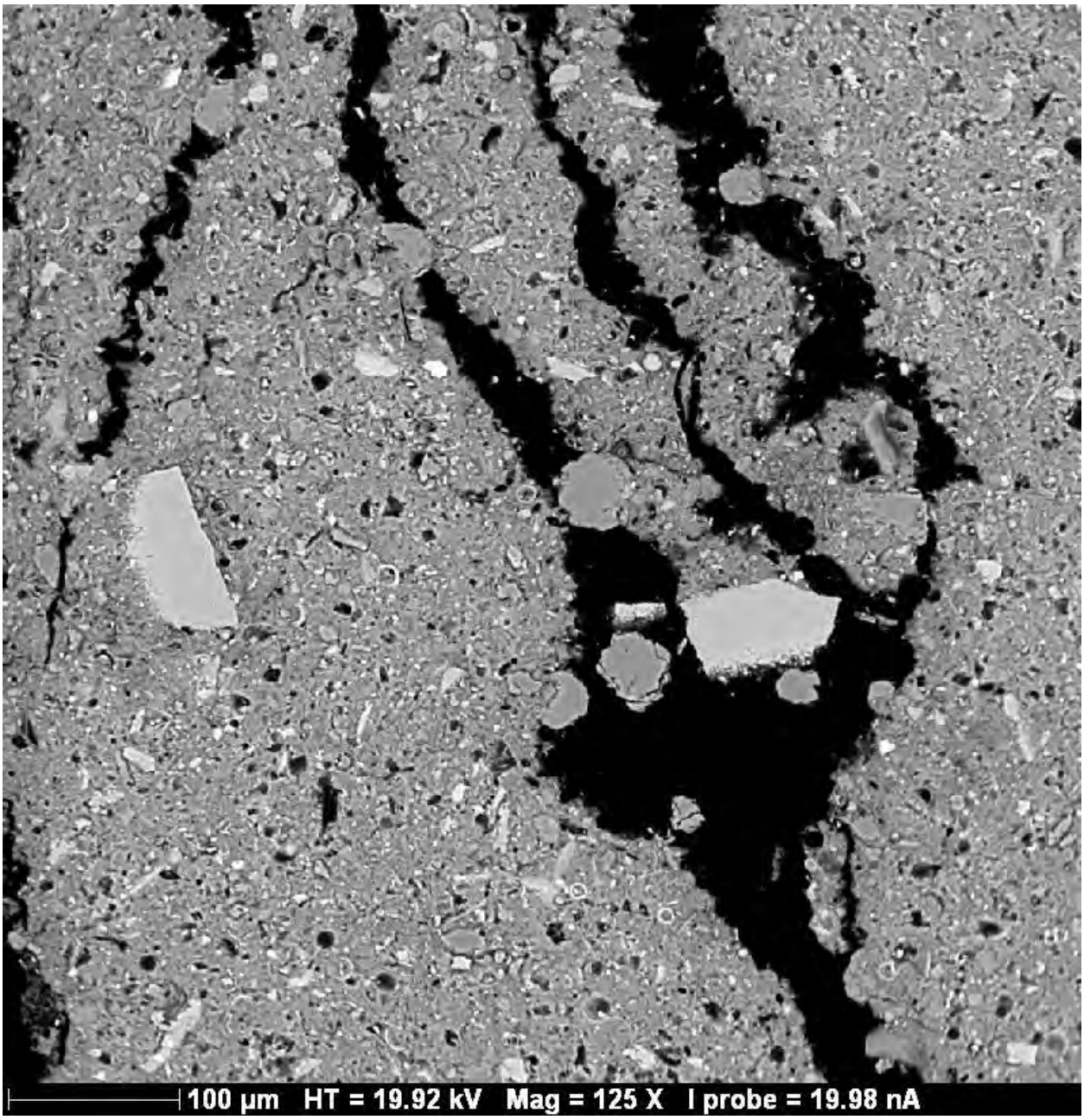
A.14-3. SEM image of EBS 14 thin section



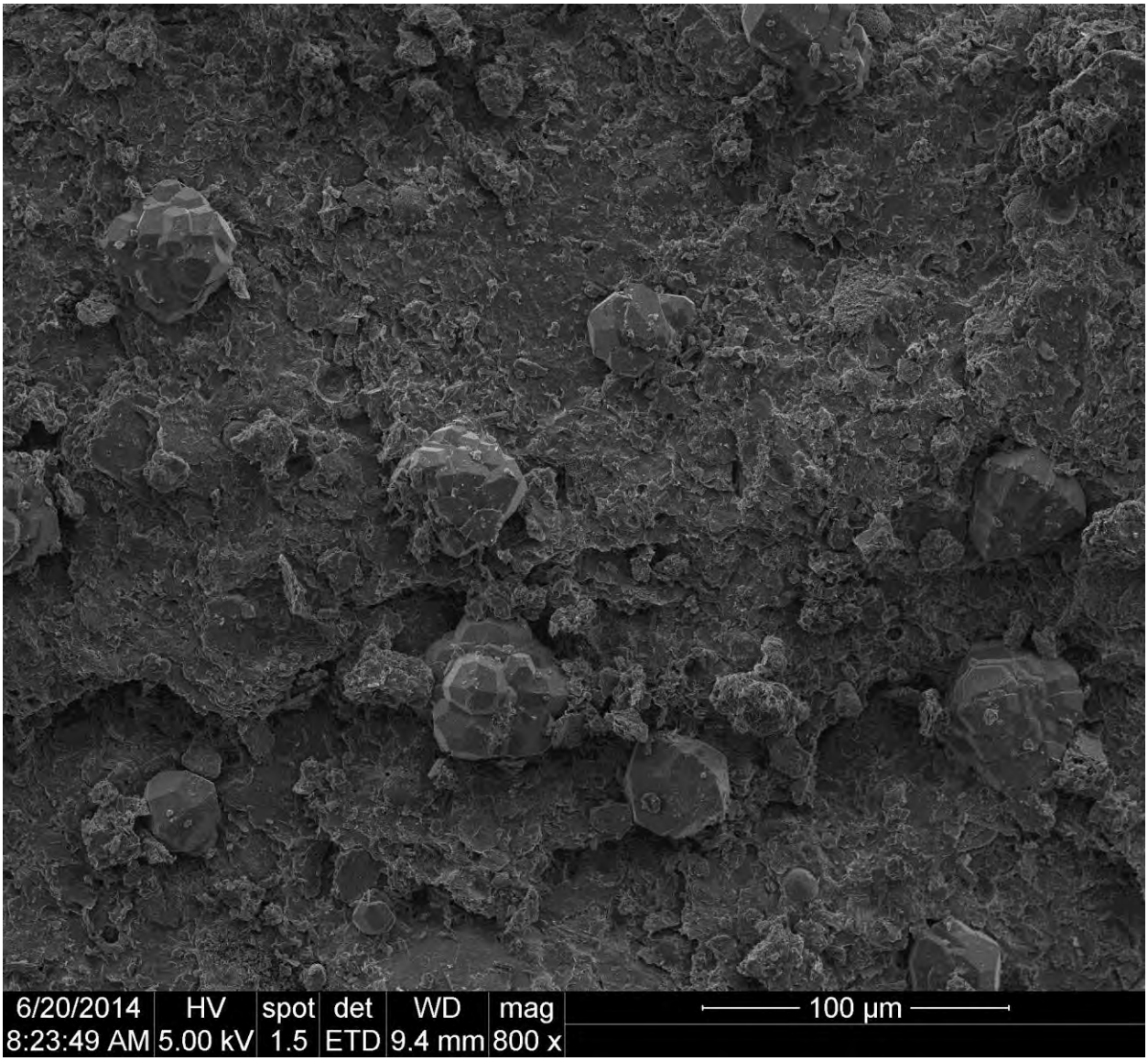
A.14-4. SEM image of crack in Opalinus with Wairakite crystals from EBS 14 thin section



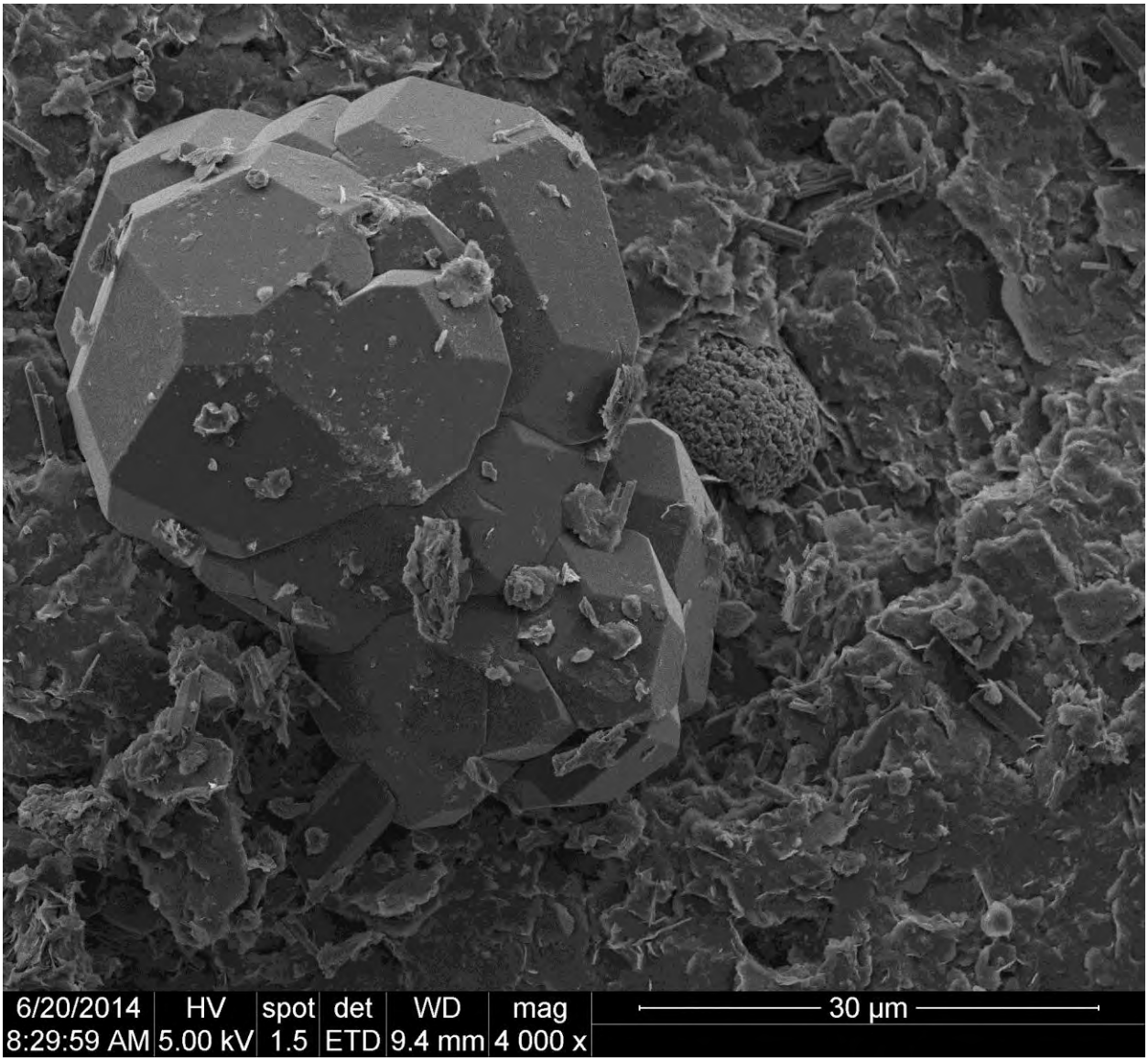
A.14-5. SEM Probe image of EBS 14 thin section. Note paucity of Wairakite crystals in Opalinus Clay matrix



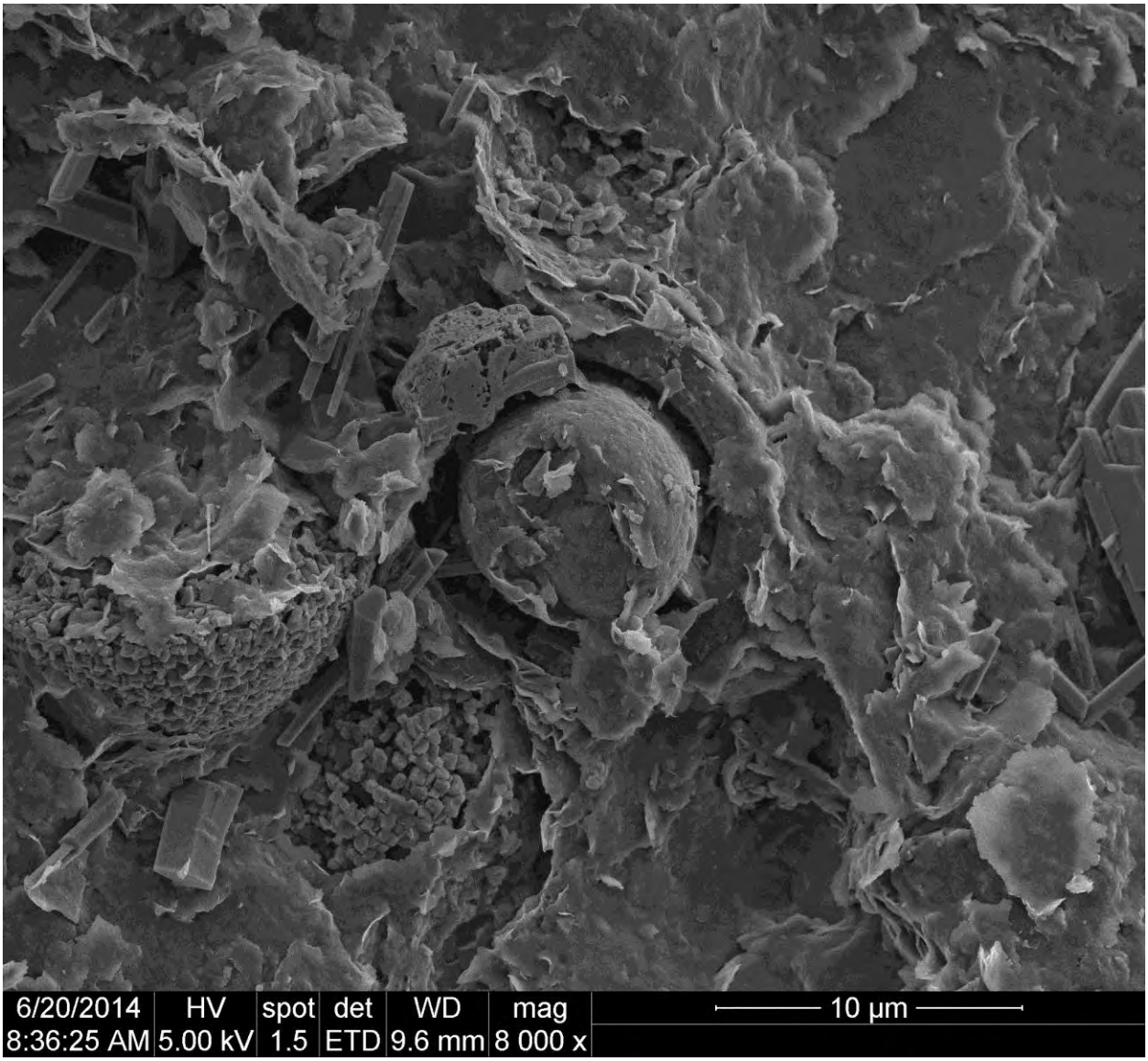
A.14-6. SEM image of large Wairakite crystals on Opalinus cracks from EBS 14 thin section



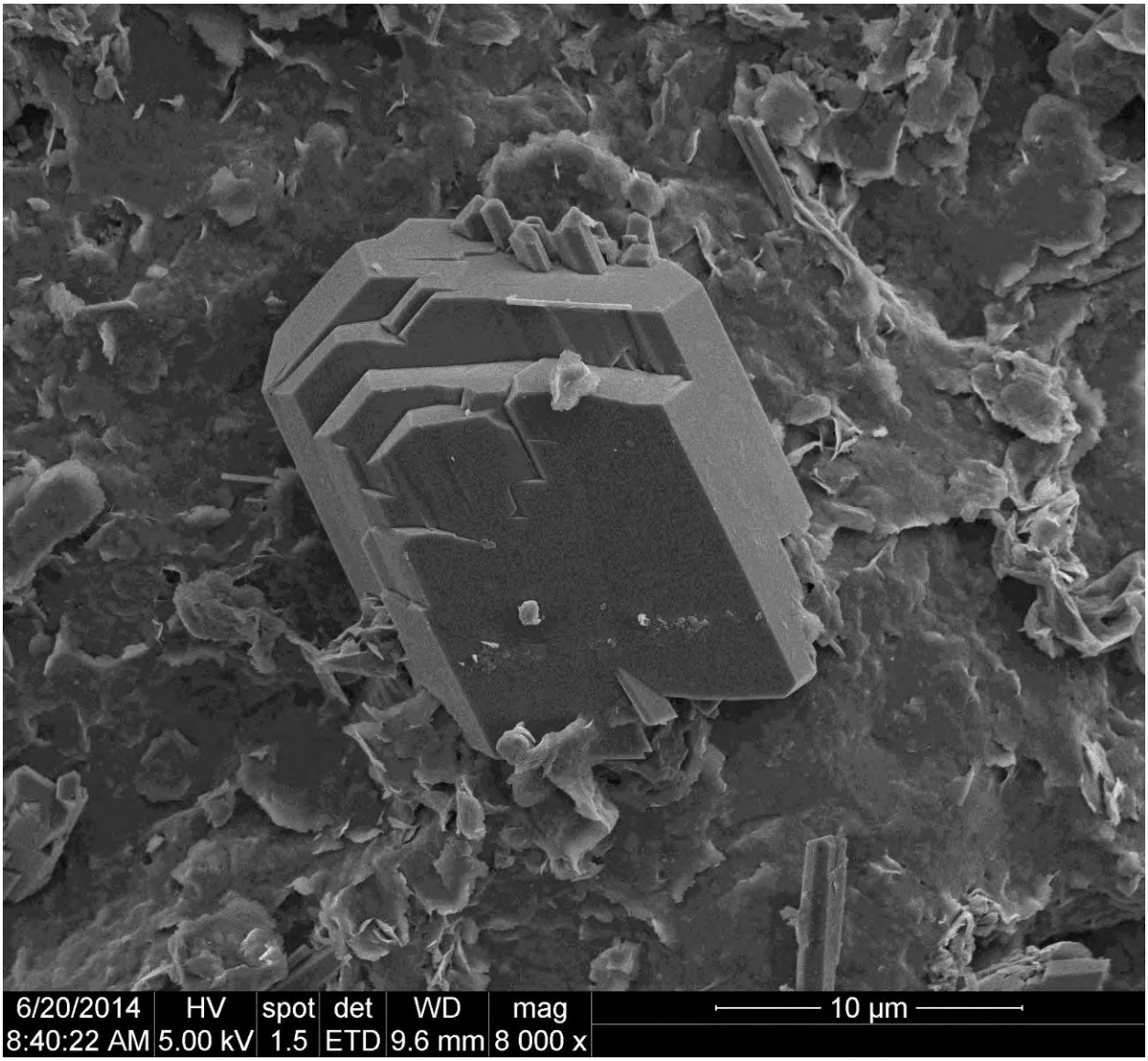
A.14-7. SEM image of smectite matrix with Wairakite crystals from EBS 14



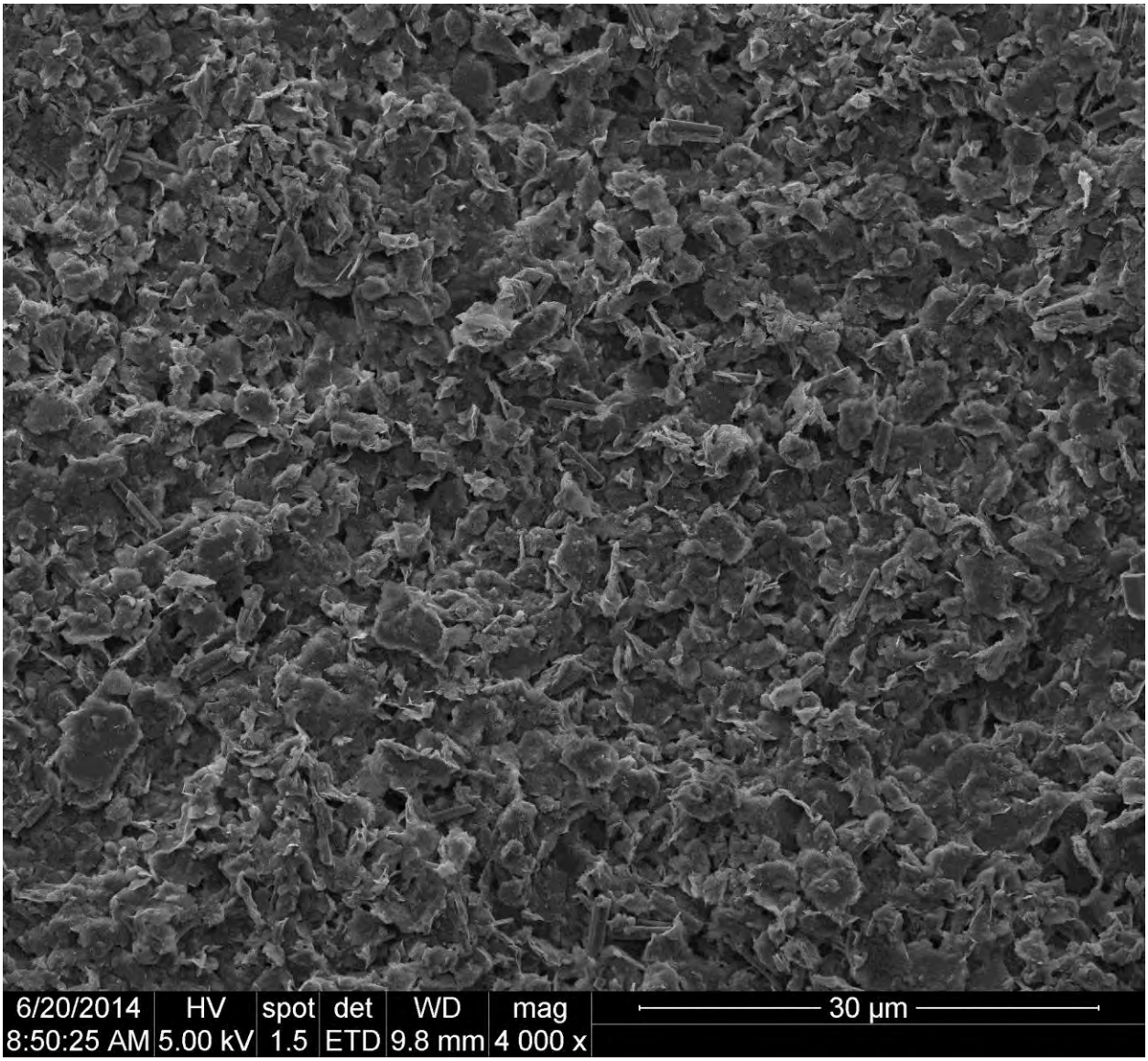
A.14-8. SEM image of Wairakite crystal from EBS 14



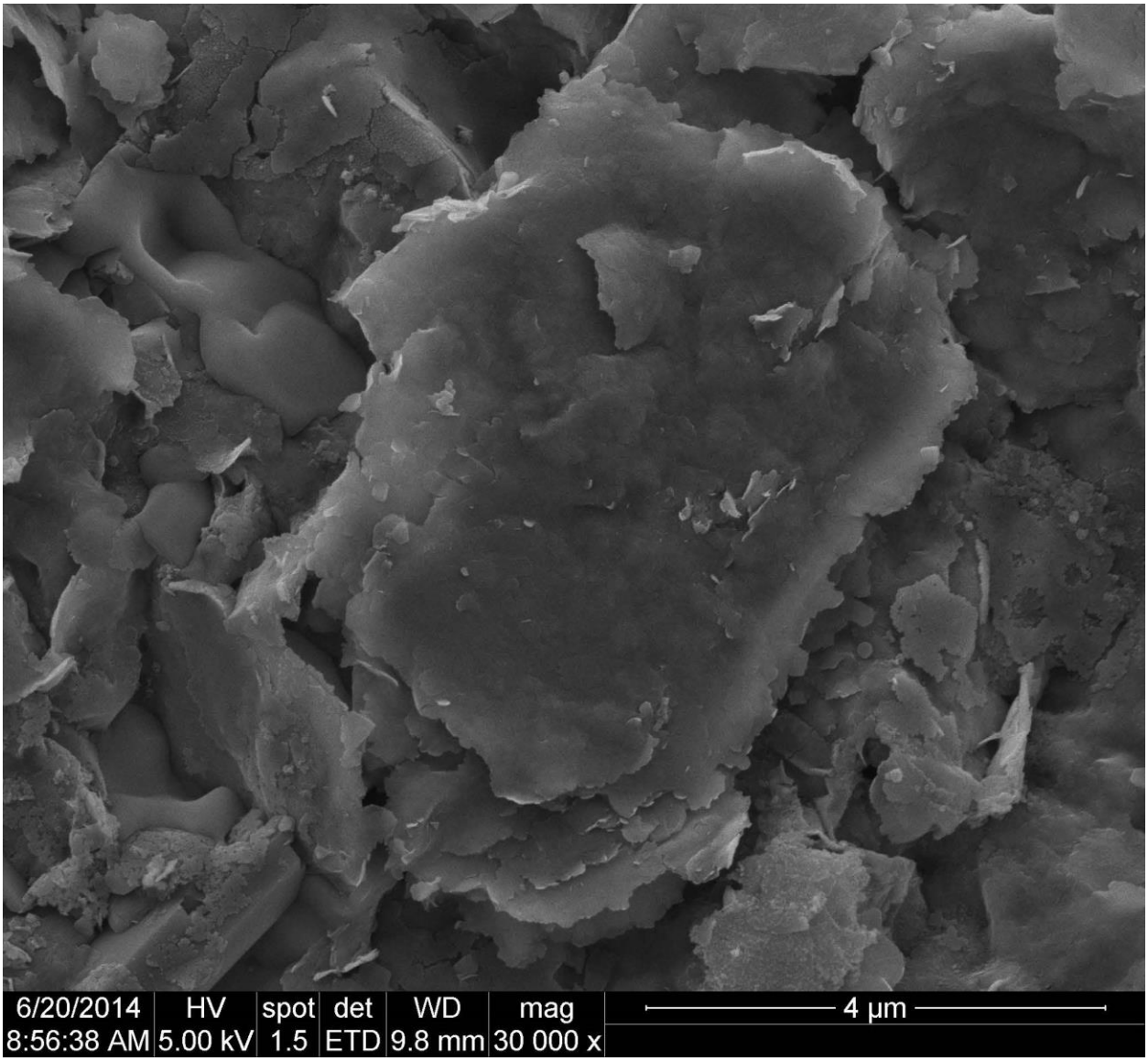
A.14-9. SEM image of sphere of CC(?) from EBS 14



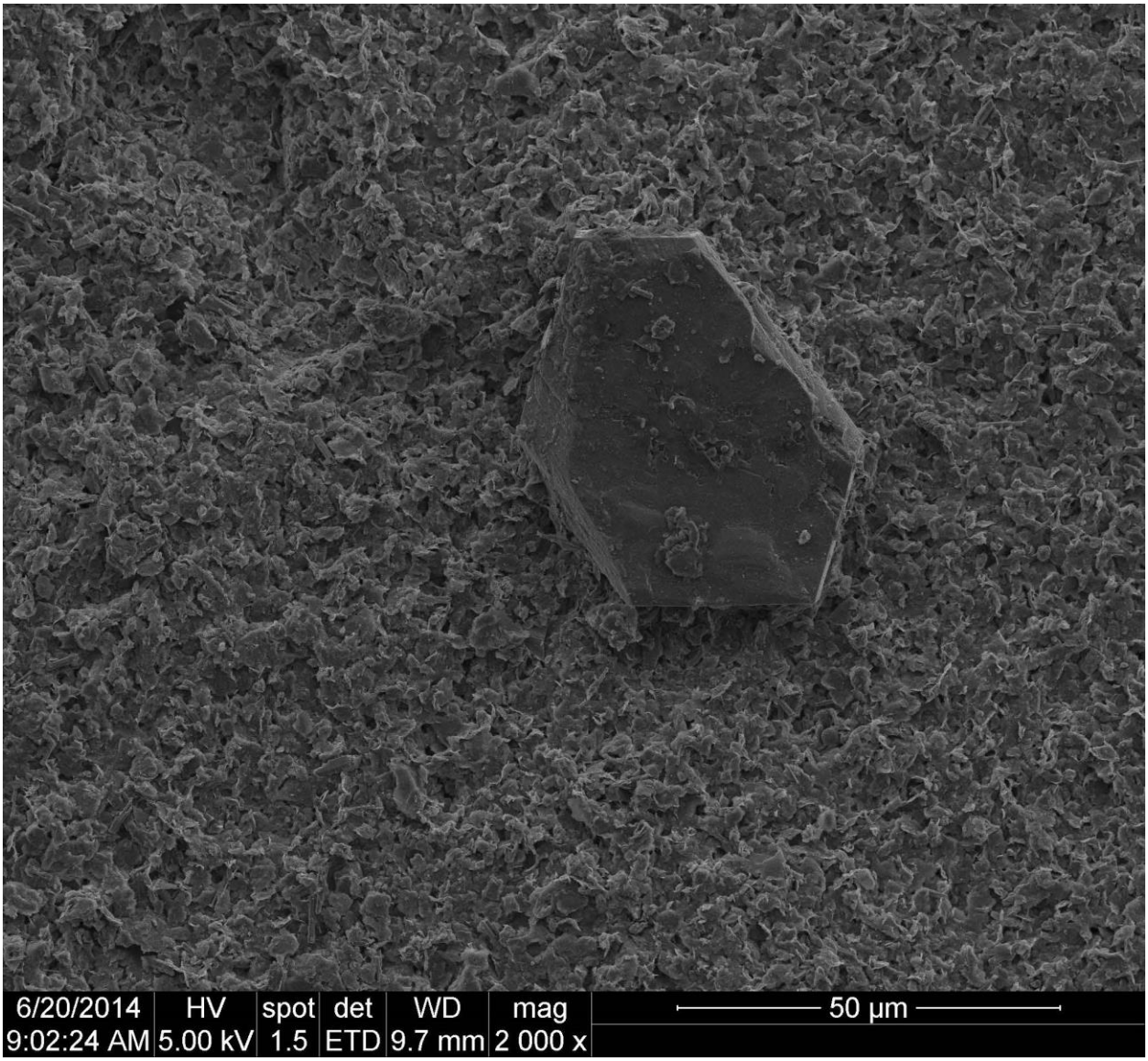
A.14-10. SEM image of feldspar from EBS 14



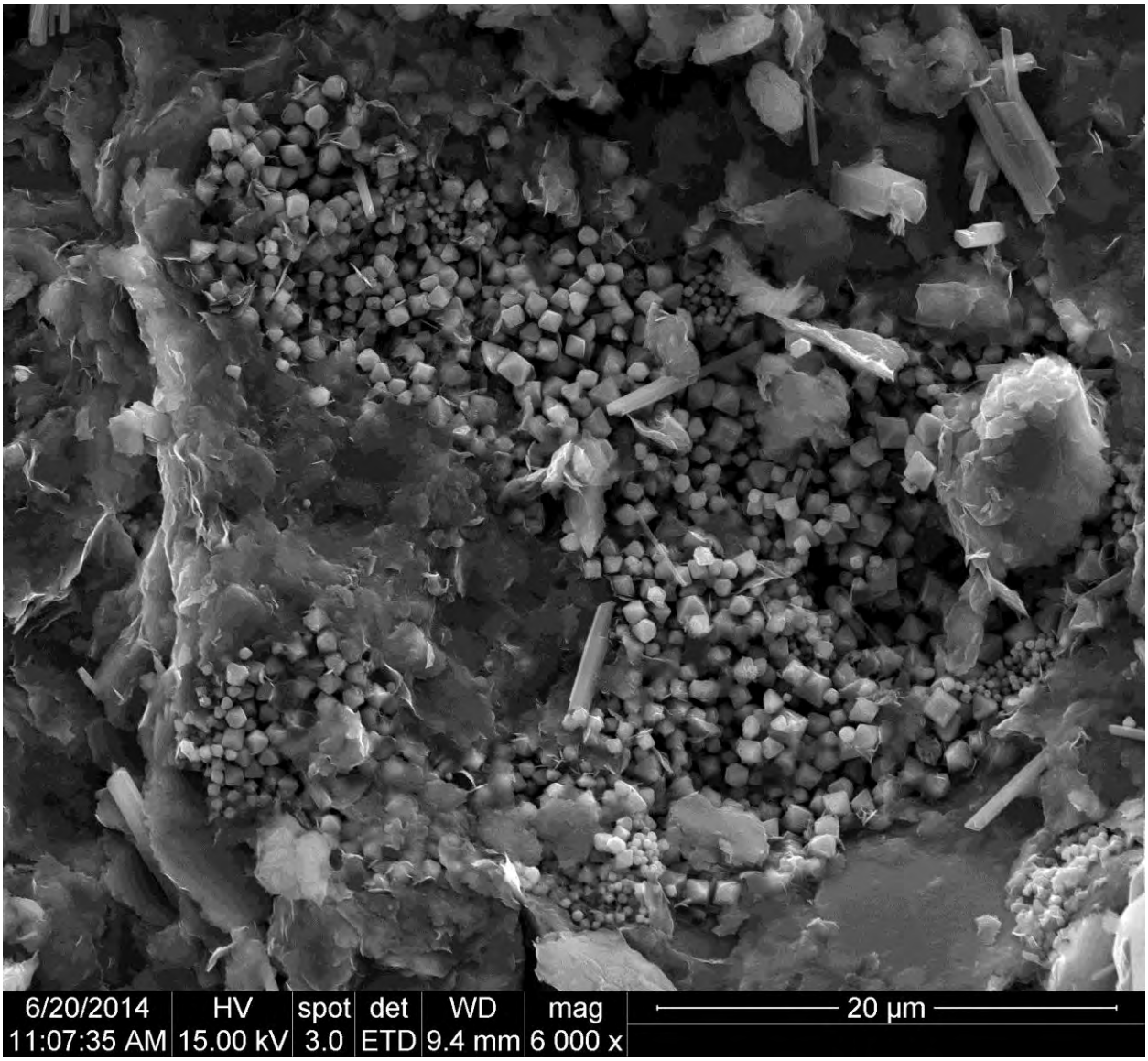
A.14-11. SEM image of smectite matrix from EBS 14



A.14-12. SEM image of corroded smectite from EBS 14



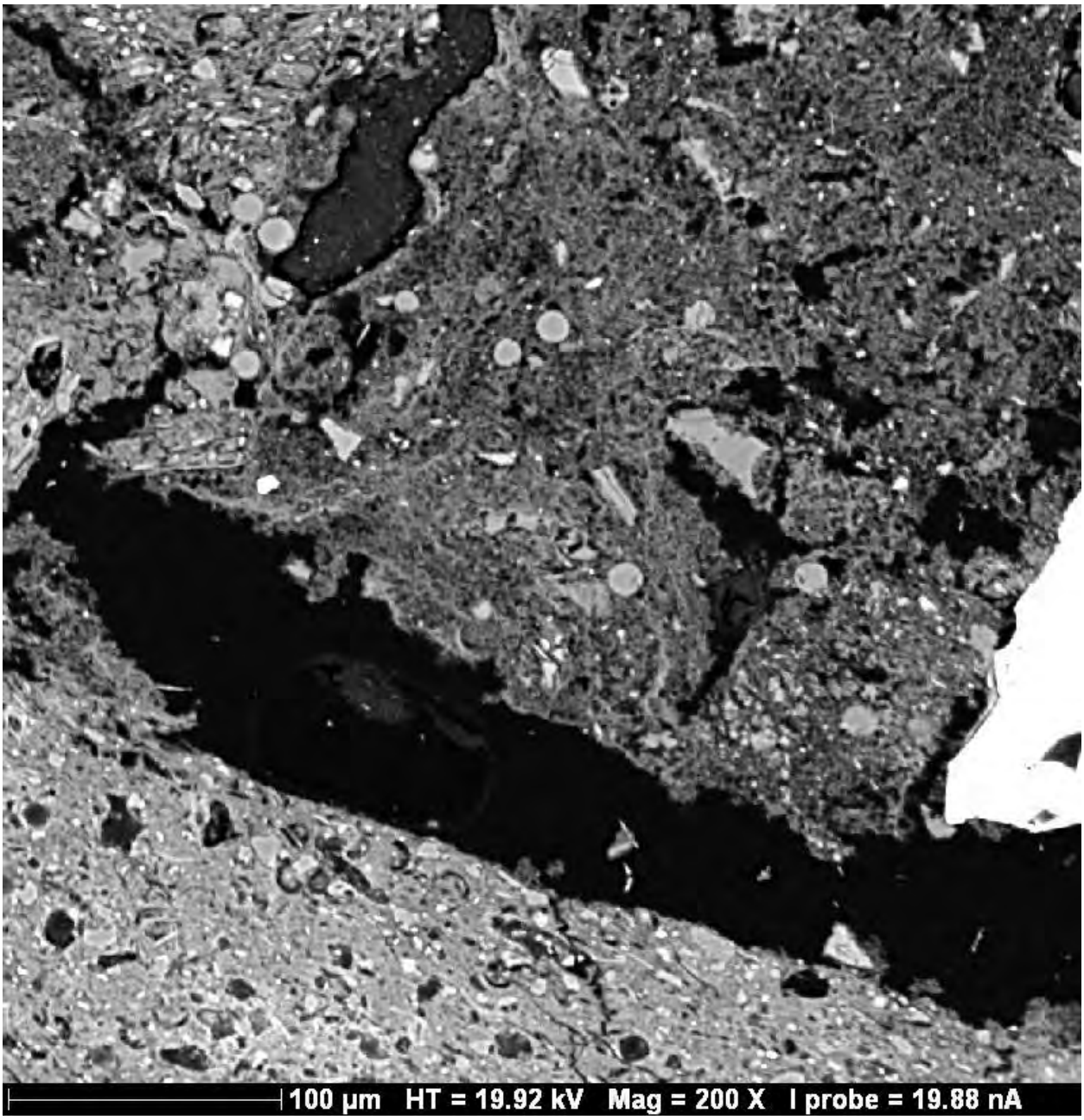
A.14-13. SEM image of possible carbonate from EBS 14



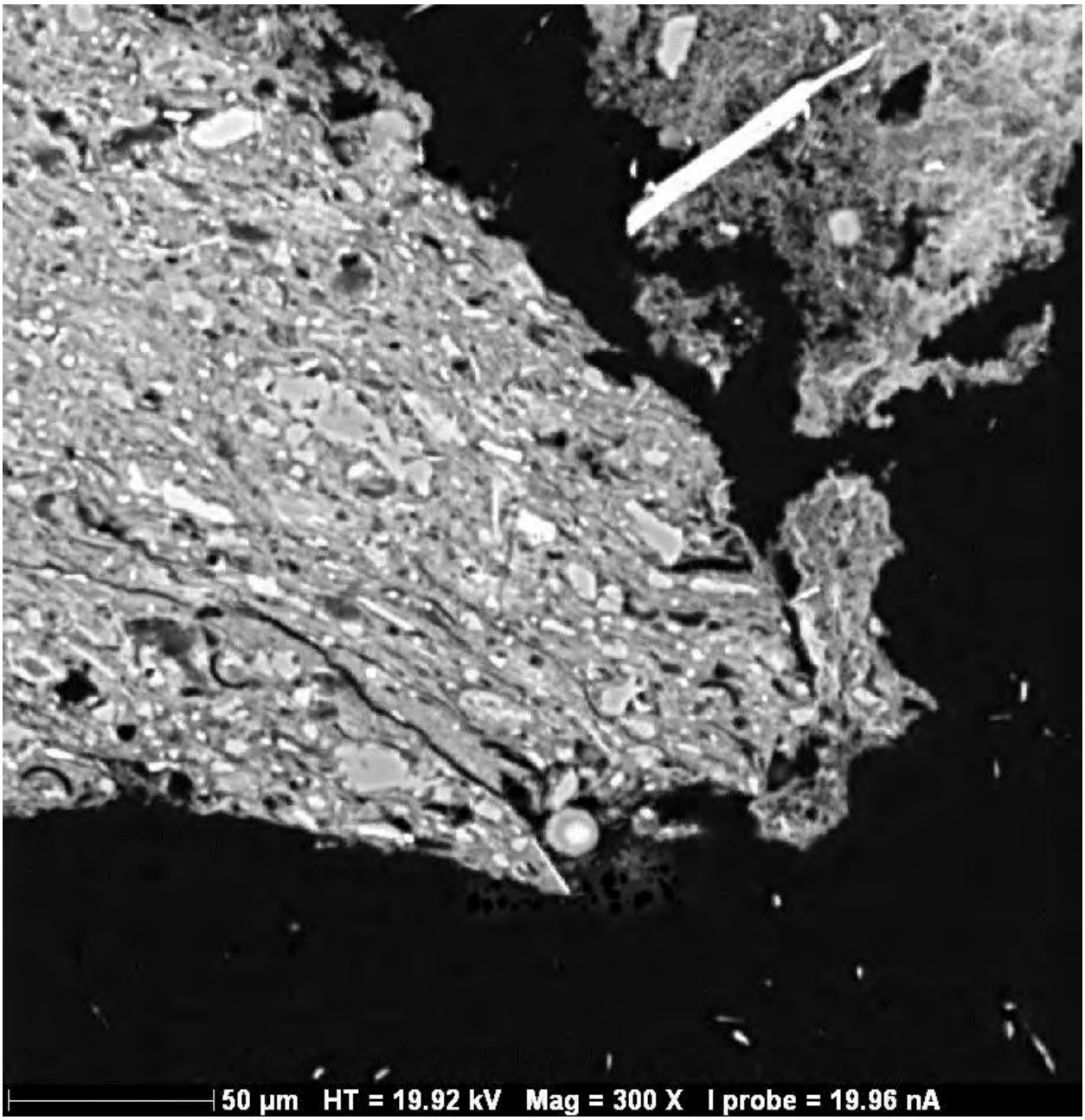
A.14-14. SEM image of pyrite framboid from EBS 14

Appendix A.15

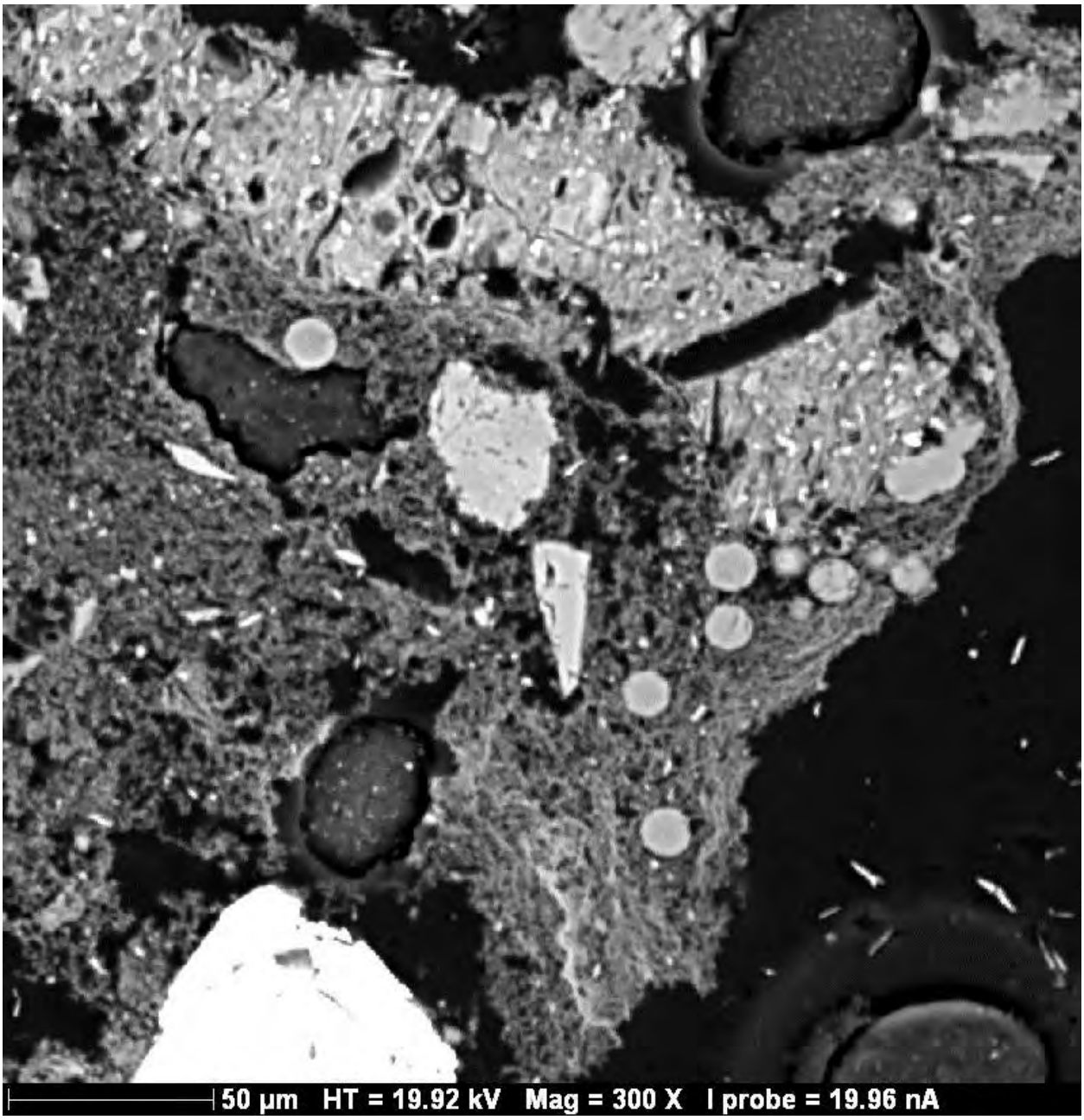
EBS-15.Isothermal at 300°C and 150 bar for 6 weeks run with Opalinus clay and 316 Stainless steel



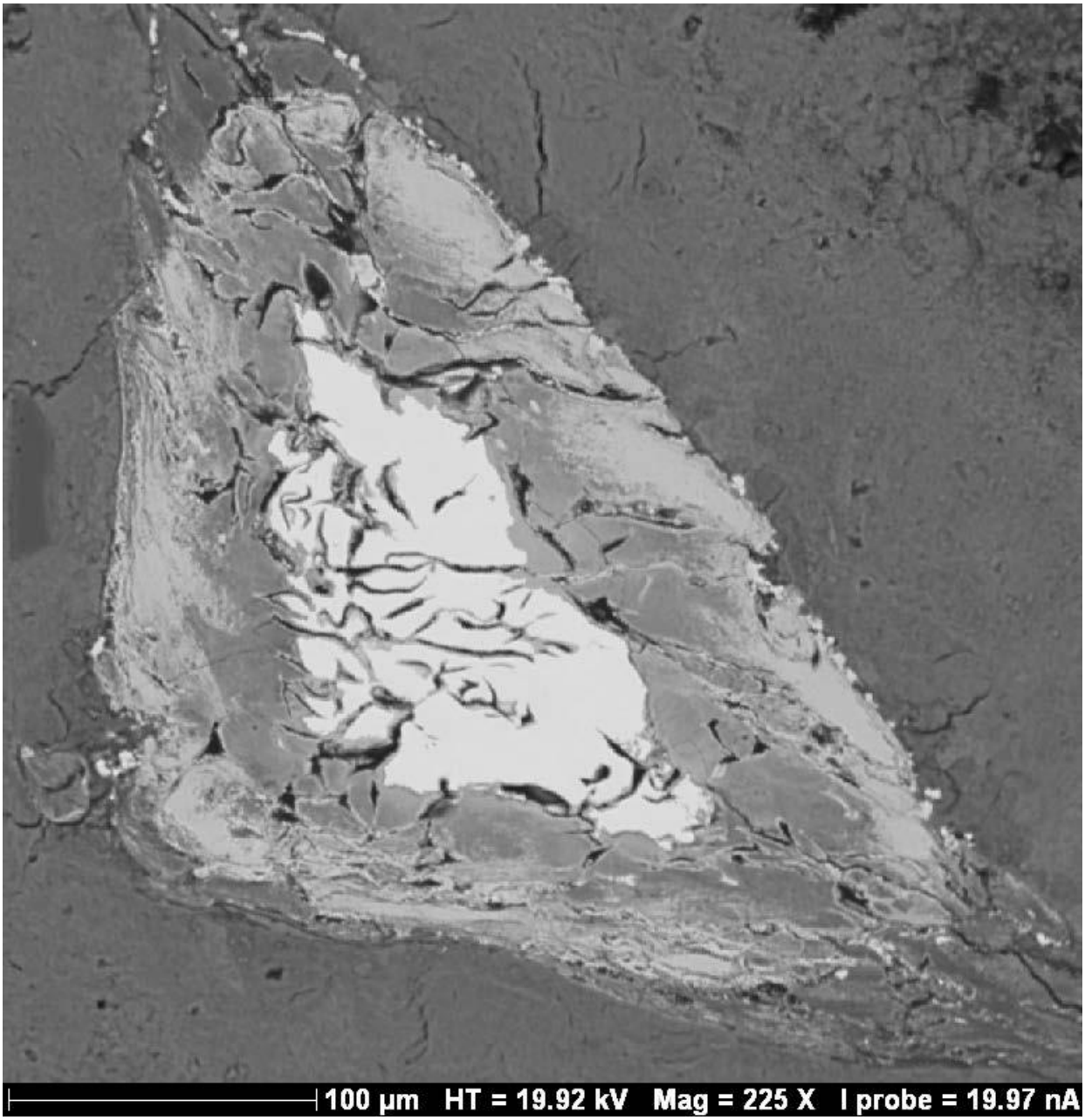
A.15-1. SEM image of EBS 15 thin section. Note zeolites



A.15-2. SEM image of EBS 15 thin section. Note zeolite at outer tip

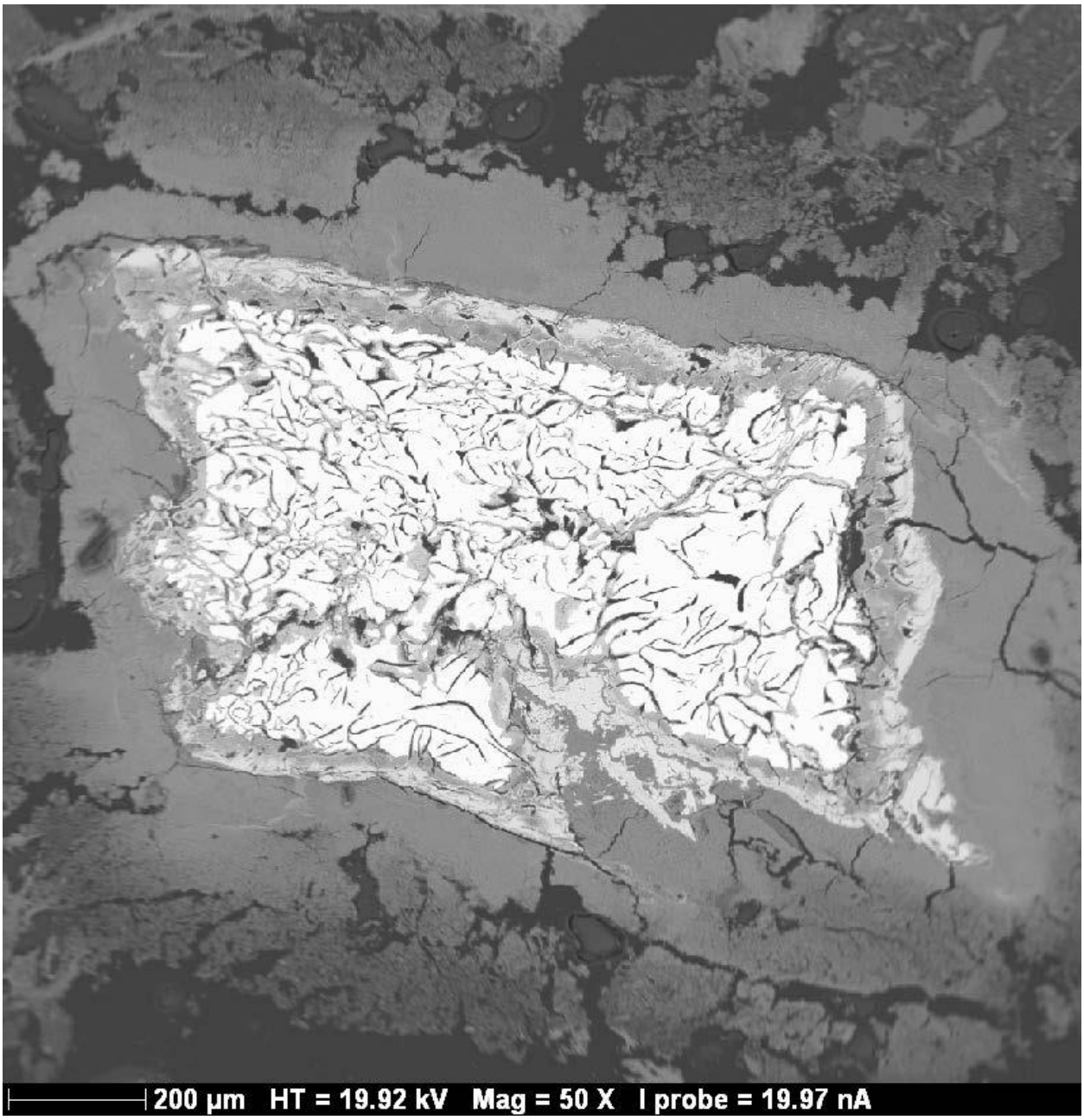


A.15-3. SEM image of EBS 15 thin section. Note zeolites

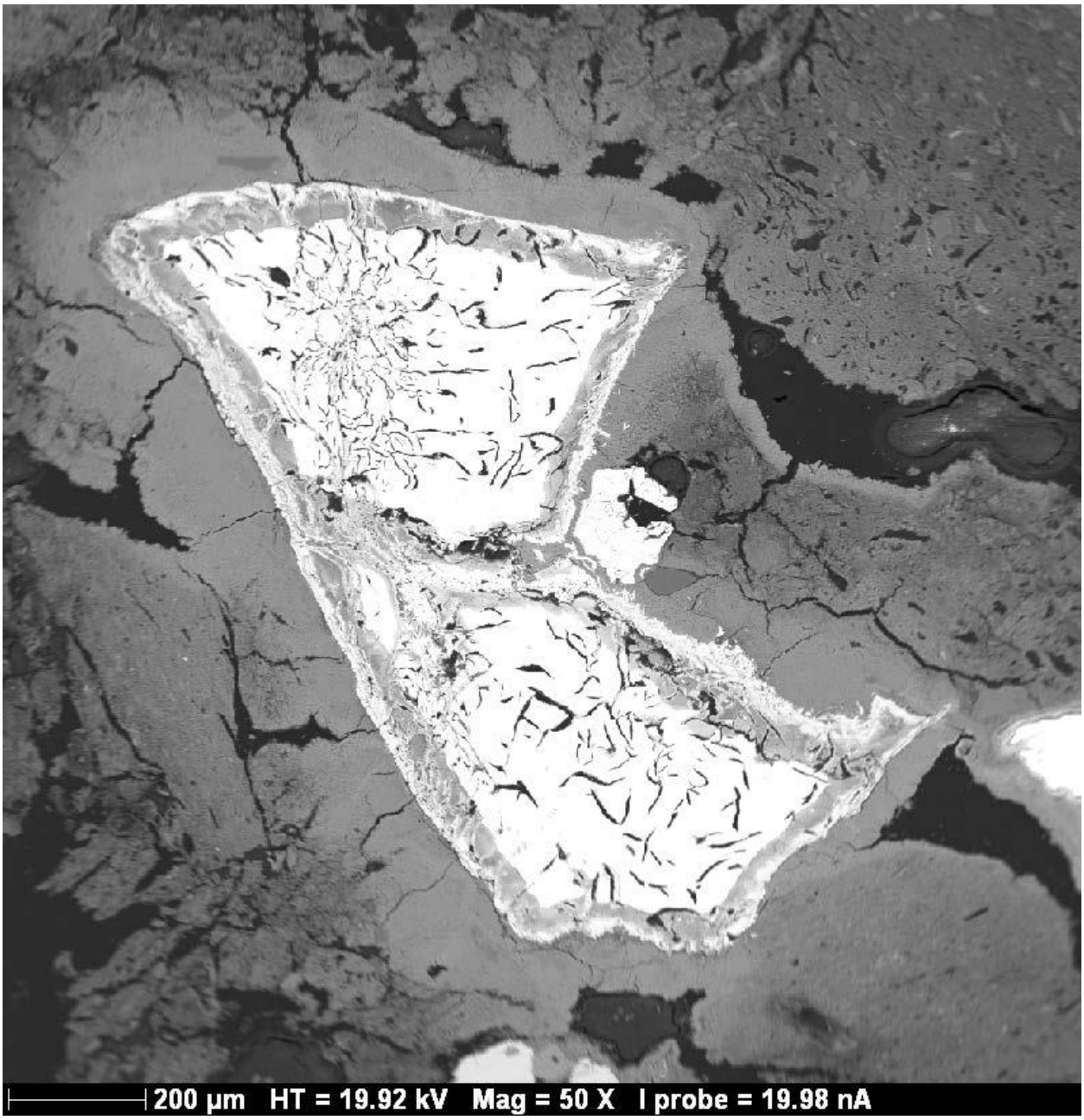


A.15-4. SEM image of EBS 15 thin section. Note zoned structure around native iron grain. Alteration phases (outward) are Fe-oxide, Fe-sulfide, stilpnomelane

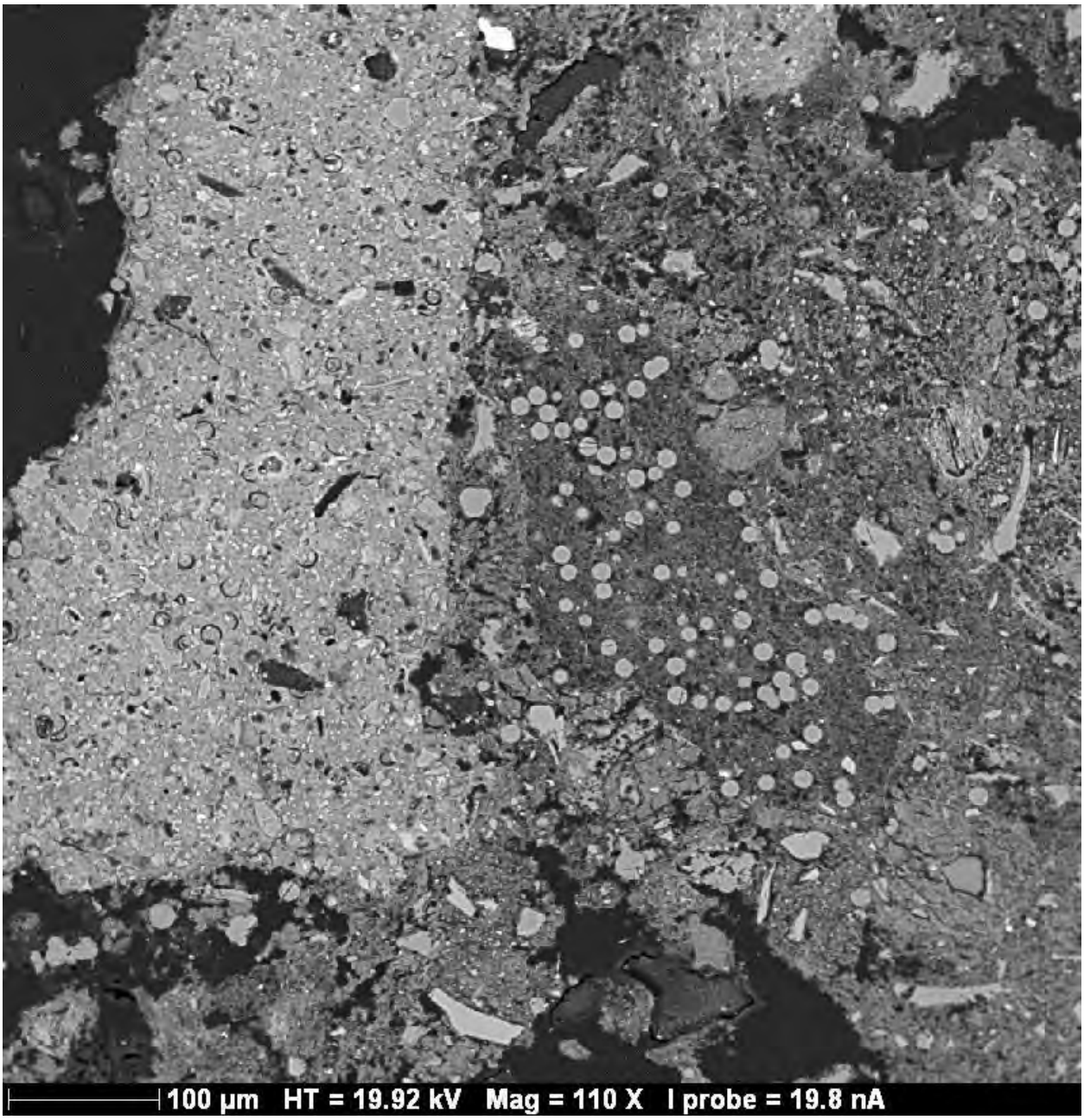
A.15-5. SEM image image of Analcime mantling plagioclase in EBS 15 thin section



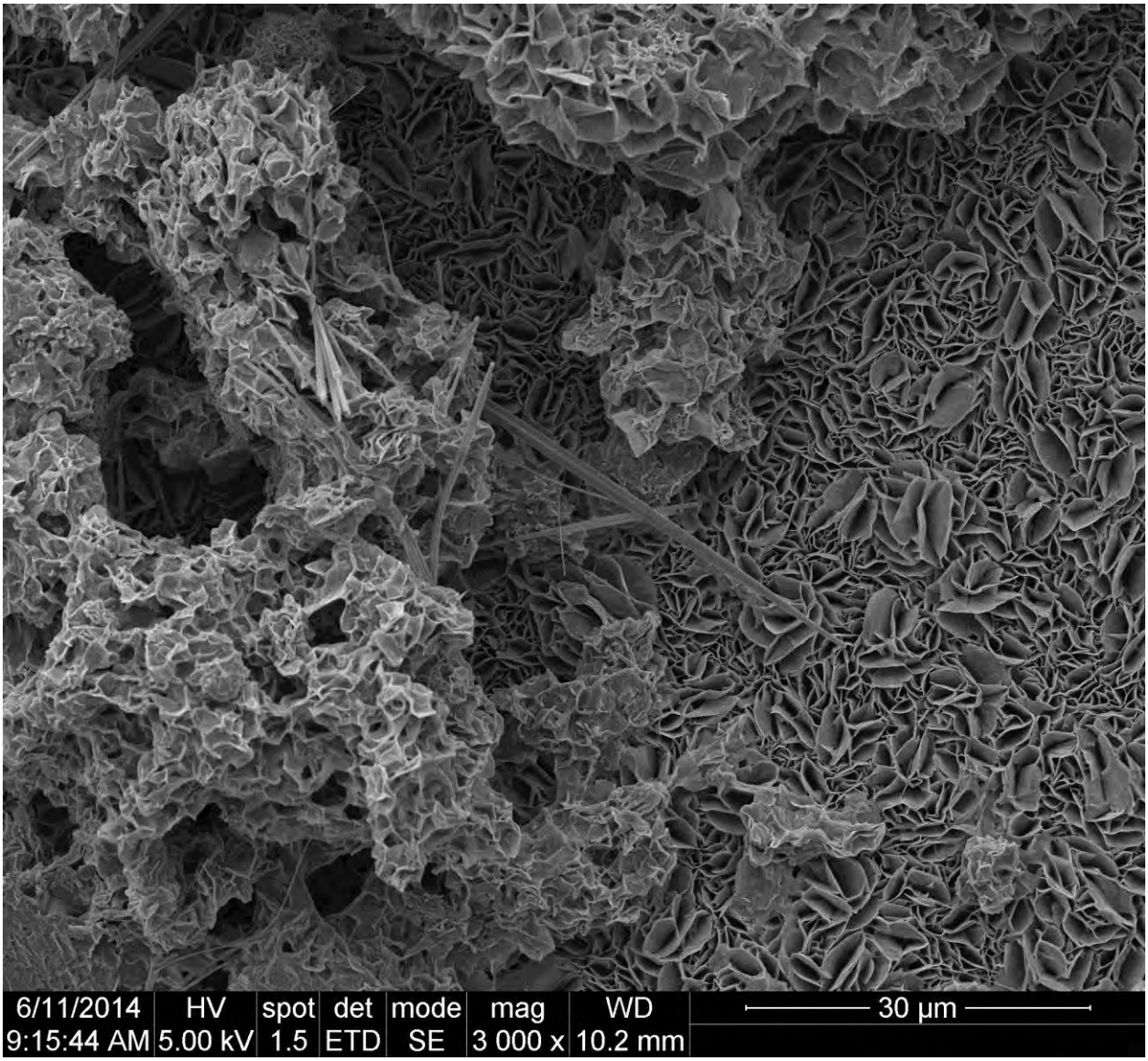
A.15-6. SEM image of EBS 15 thin section. Note zoned structure around native iron grain. Alteration phases (outward) are Fe-oxide, Fe-sulfide, stilpnomelane



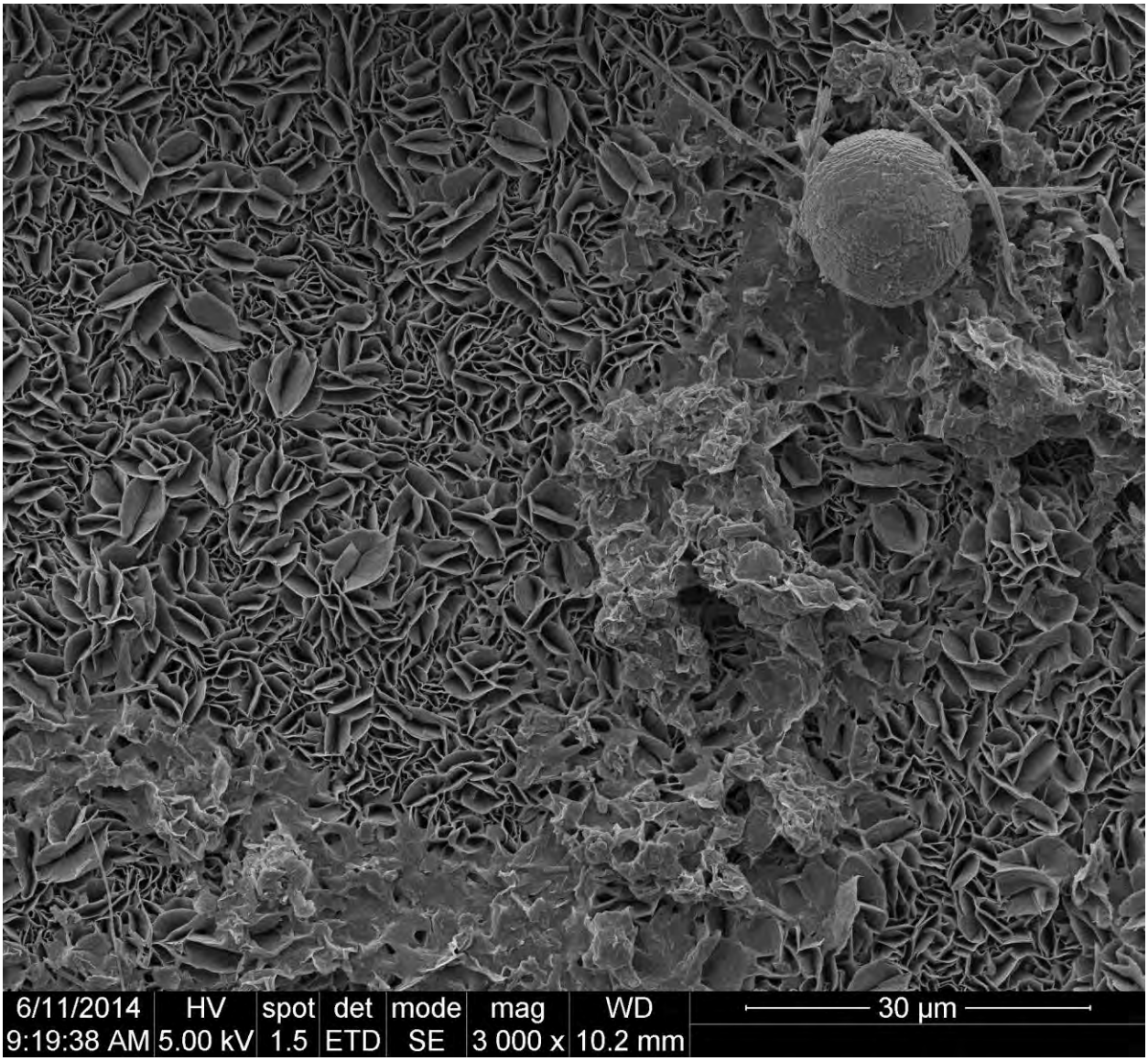
A.15-7. SEM image of EBS 15 thin section. Note zoned structure around native iron grain. Alteration phases (outward) are Fe-oxide, Fe-sulfide, stilpnomelane



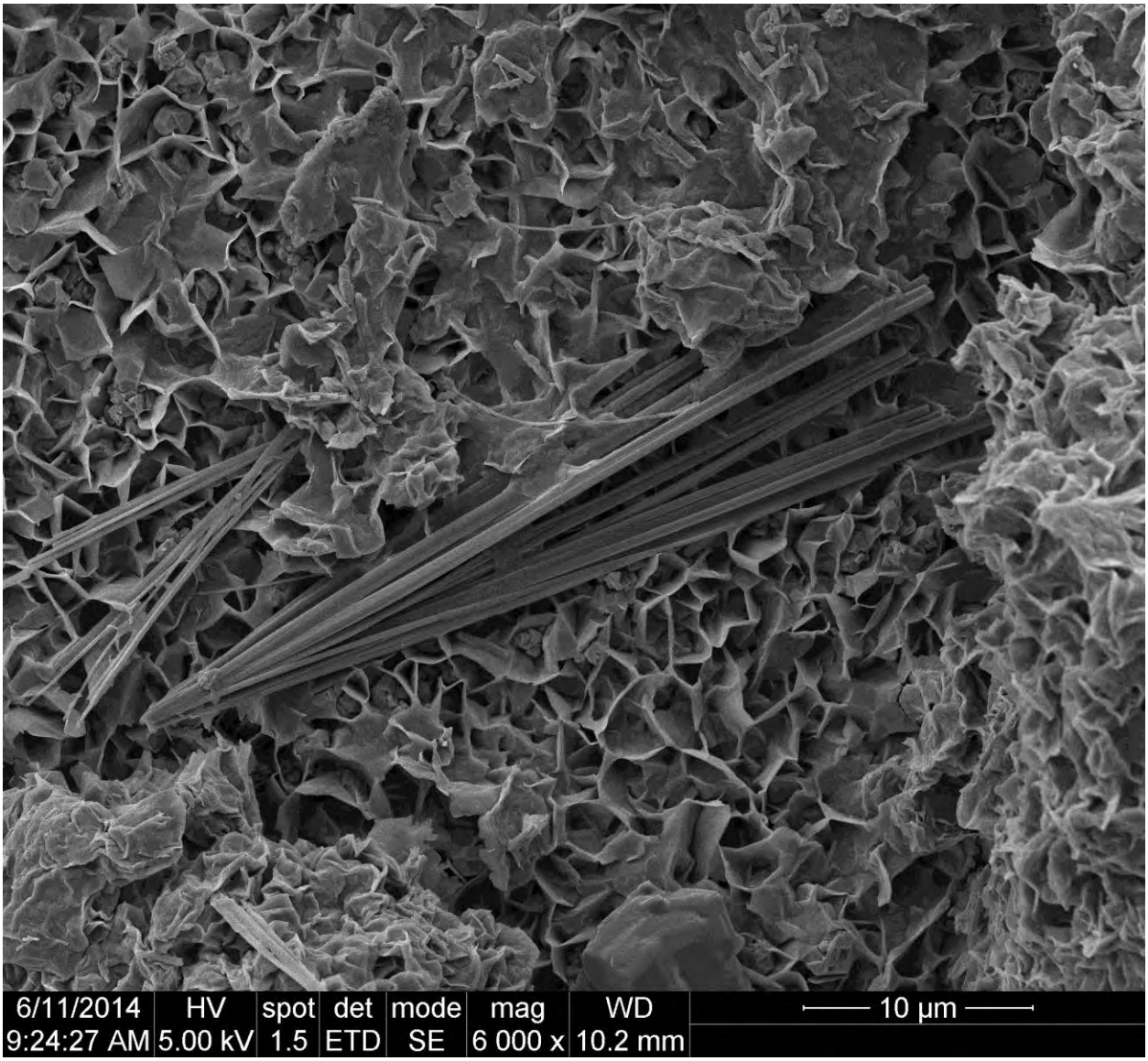
A.15-8. SEM image of Opalinus clay on the left and bentonite on the right with Analcime growth from EBS 15



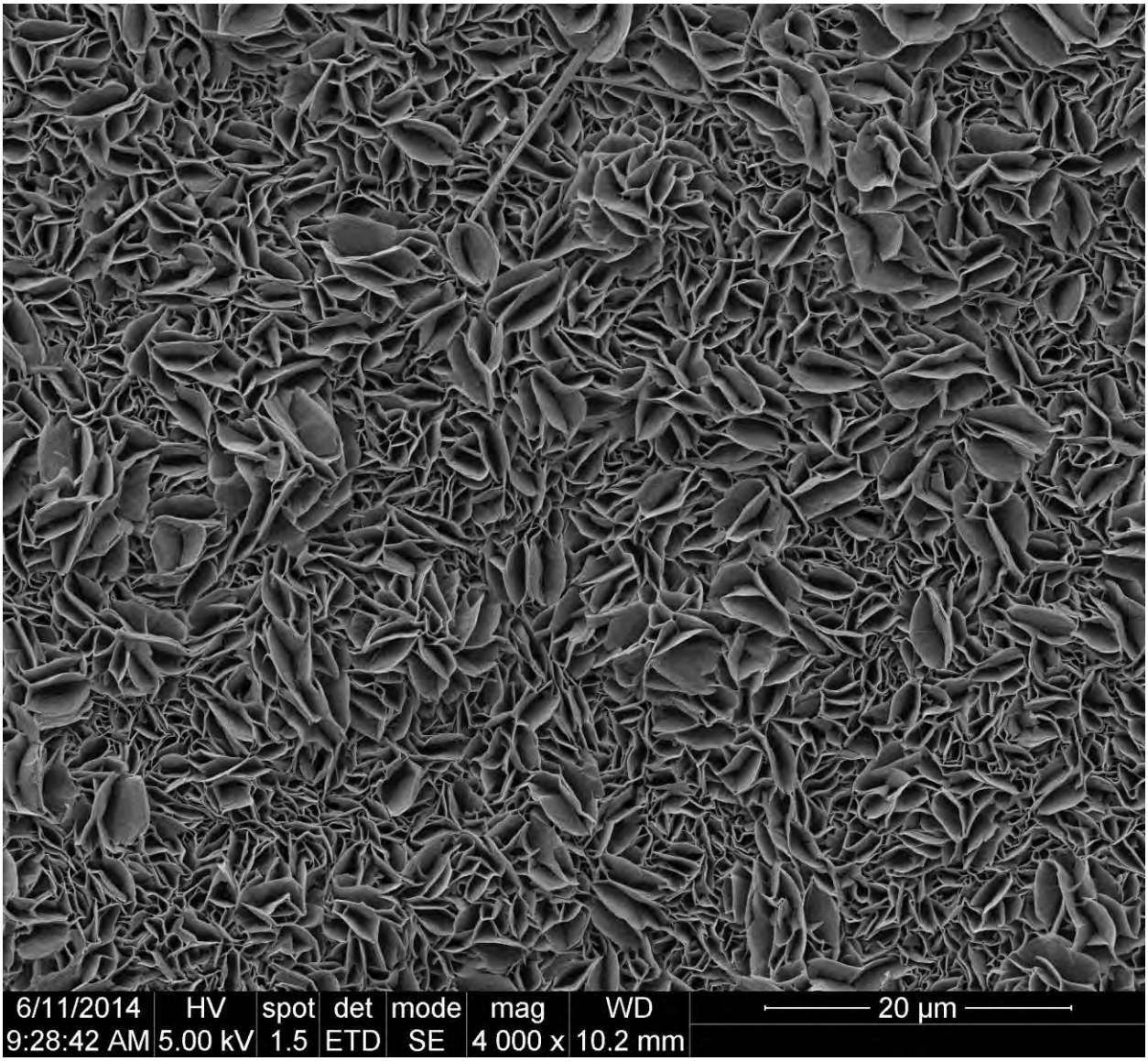
A.15-9. SEM image of unknown fibrous material on saponite from EBS 15



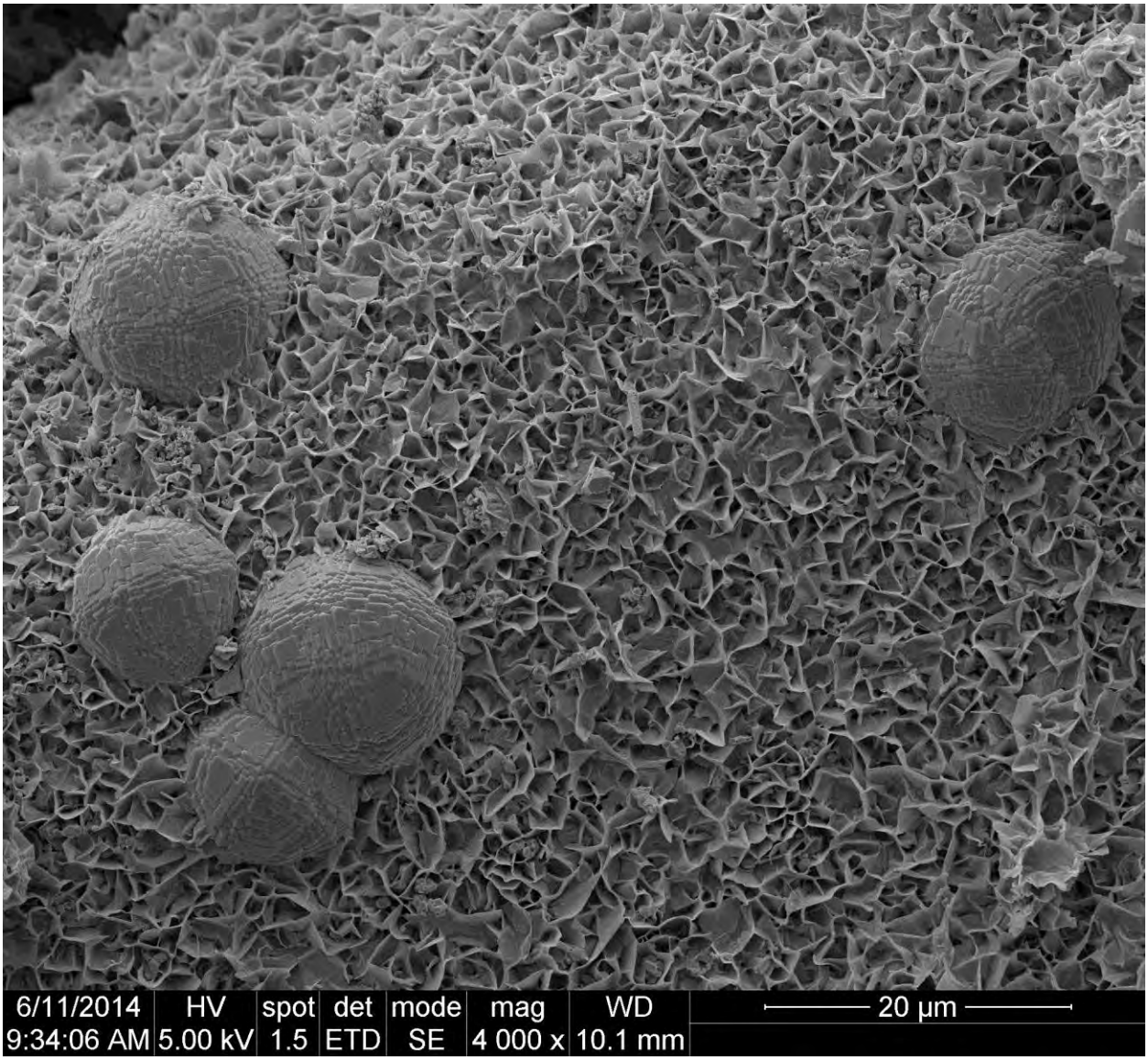
A.15-10. SEM image of saponite and Analcime -Wairakite crystals on 316 stainless steel



A.15-11. SEM image of fibrous (Millerite) on saponite from EBS 15

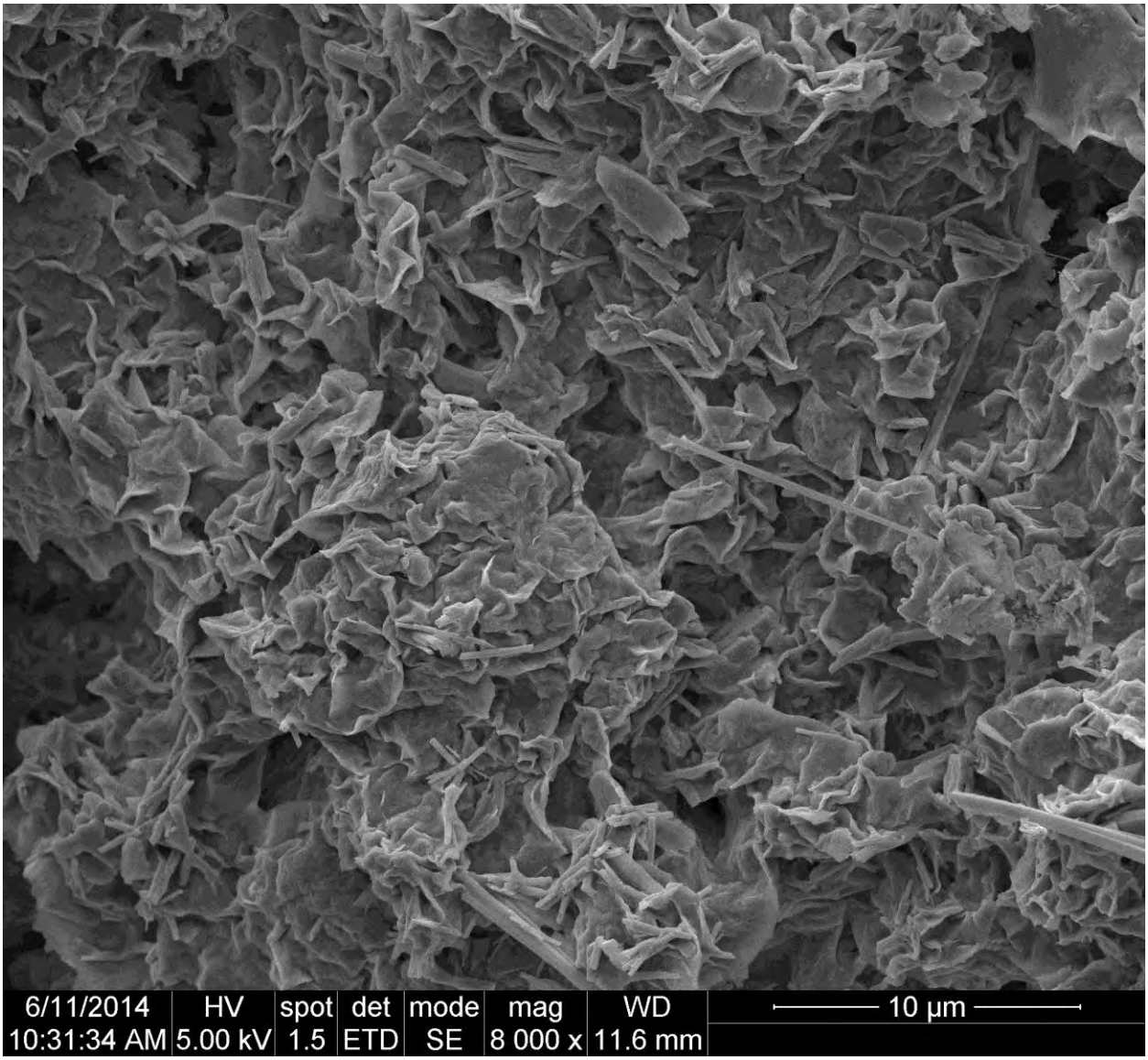


A.15-12. SEM image of saponite mat from EBS 15

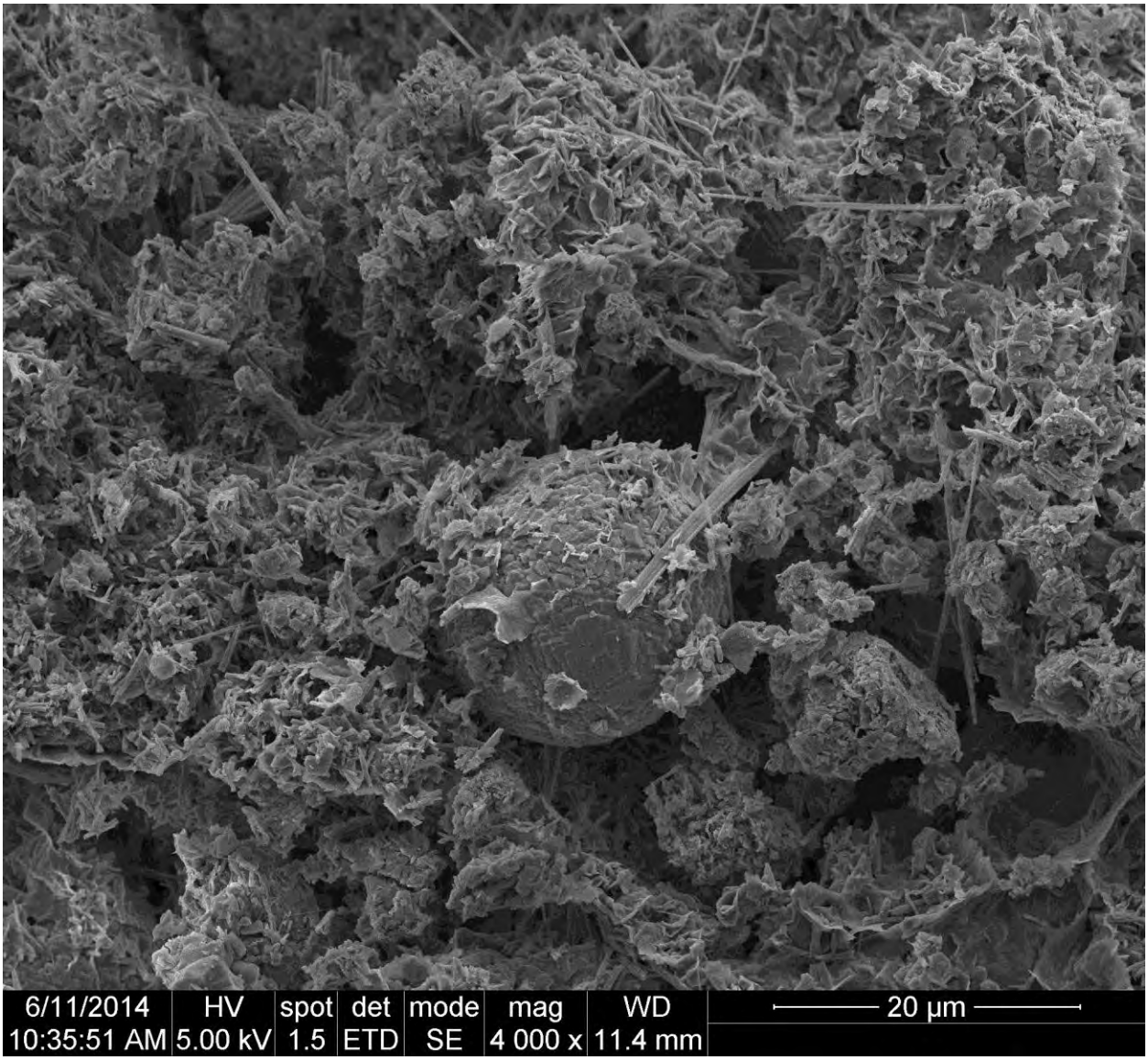


A.15-13. SEM image of Analcime-Wairakite on smectite from EBS 15

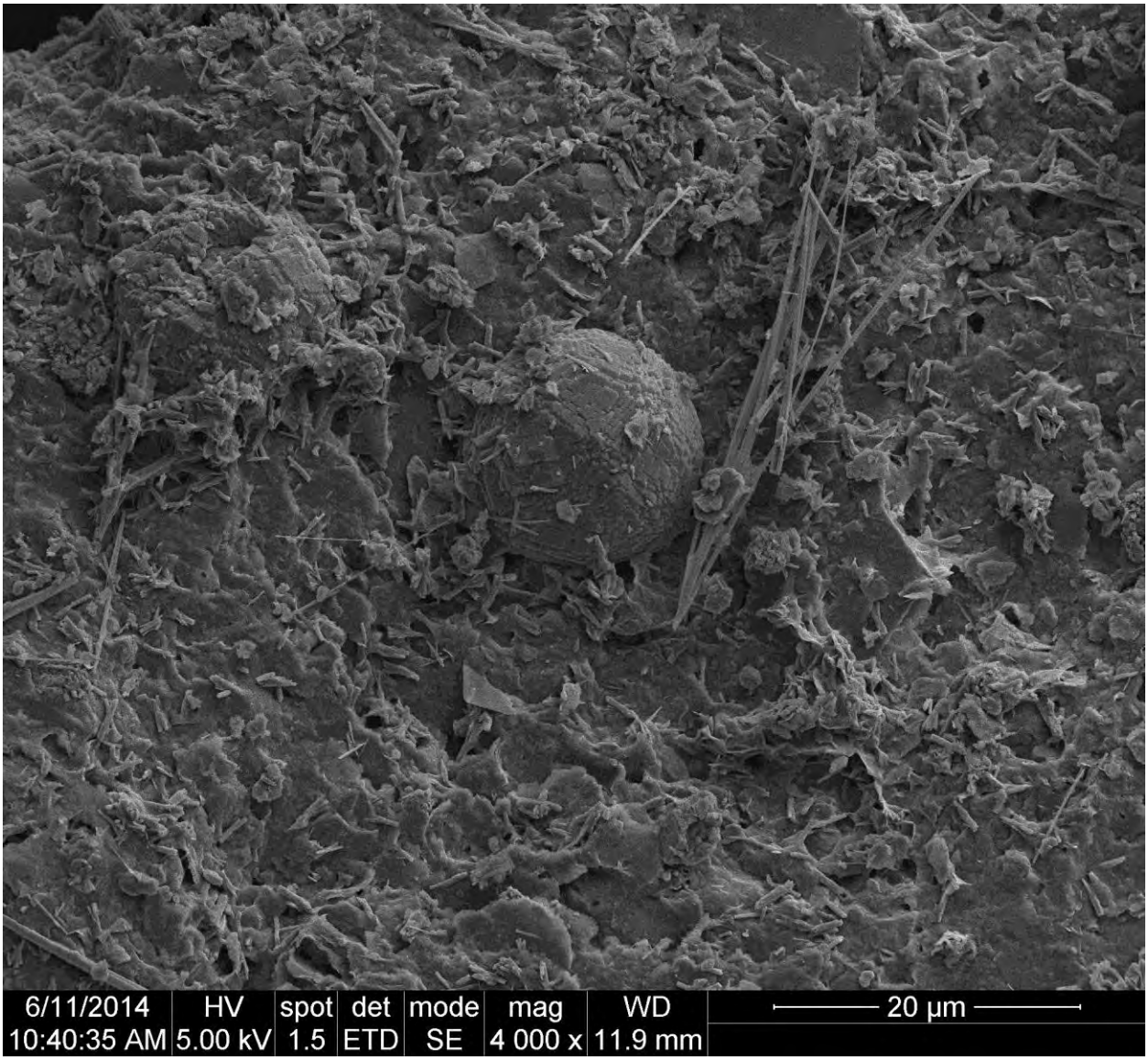
A.15-14. SEM image of possible illite growth from EBS 15



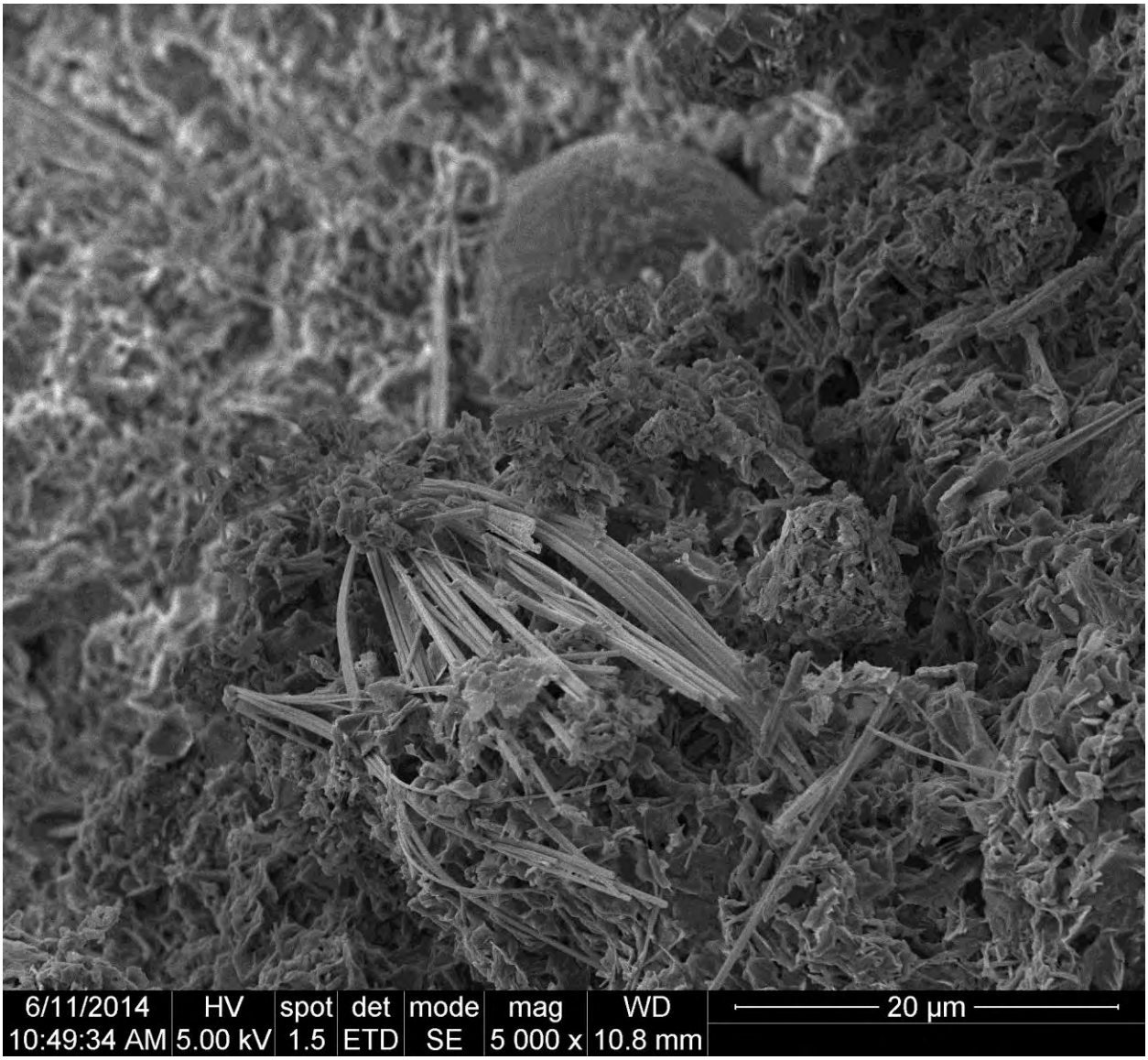
A.15-15. SEM image of foliated bentonite with possible illite



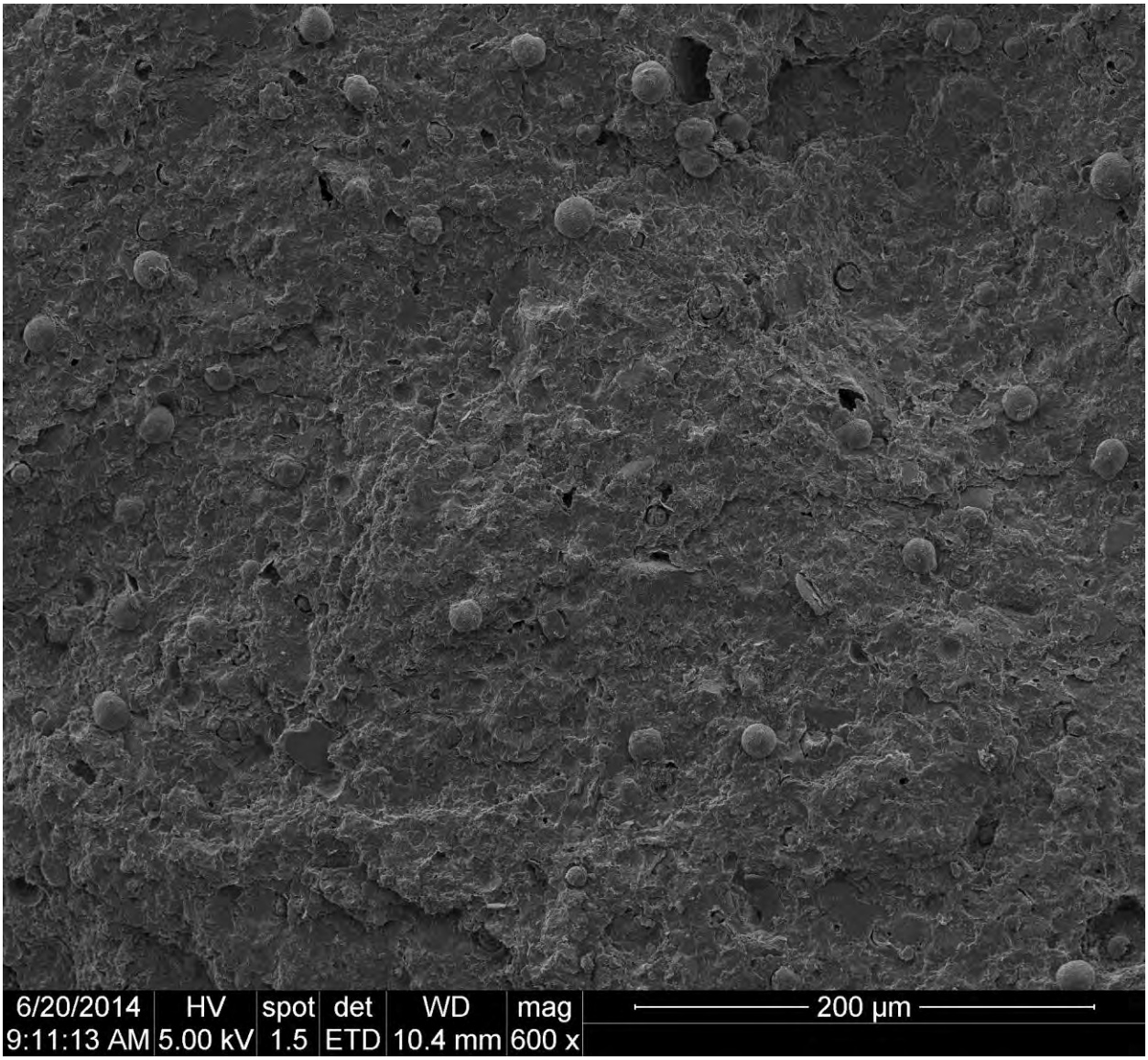
A.15-16. SEM image of Analcime - Wairakite solid solution with clay and illite from EBS 15



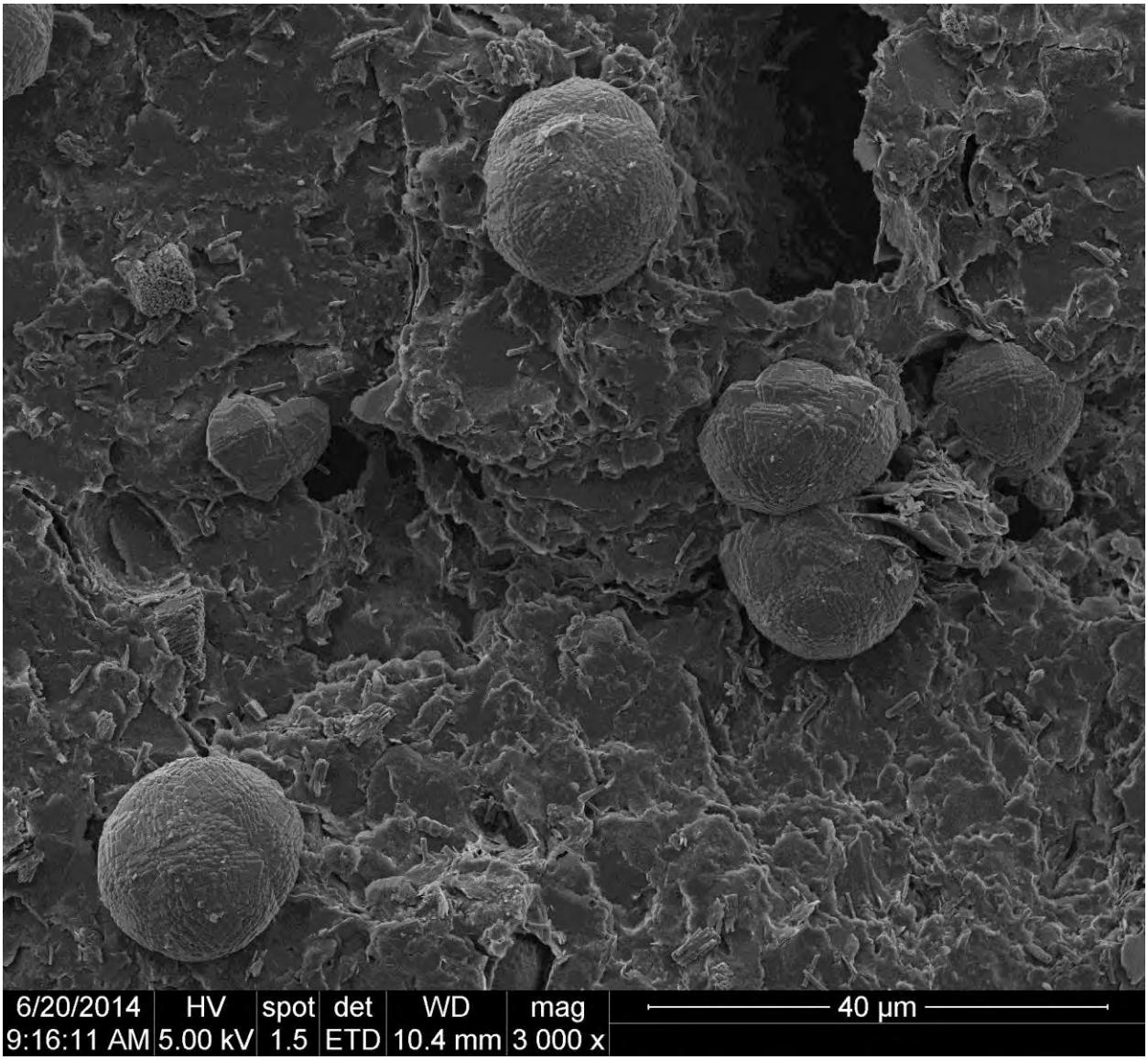
A.15-17. SEM image of Analcime – Wairakite solid solution with clay and illite from EBS 15



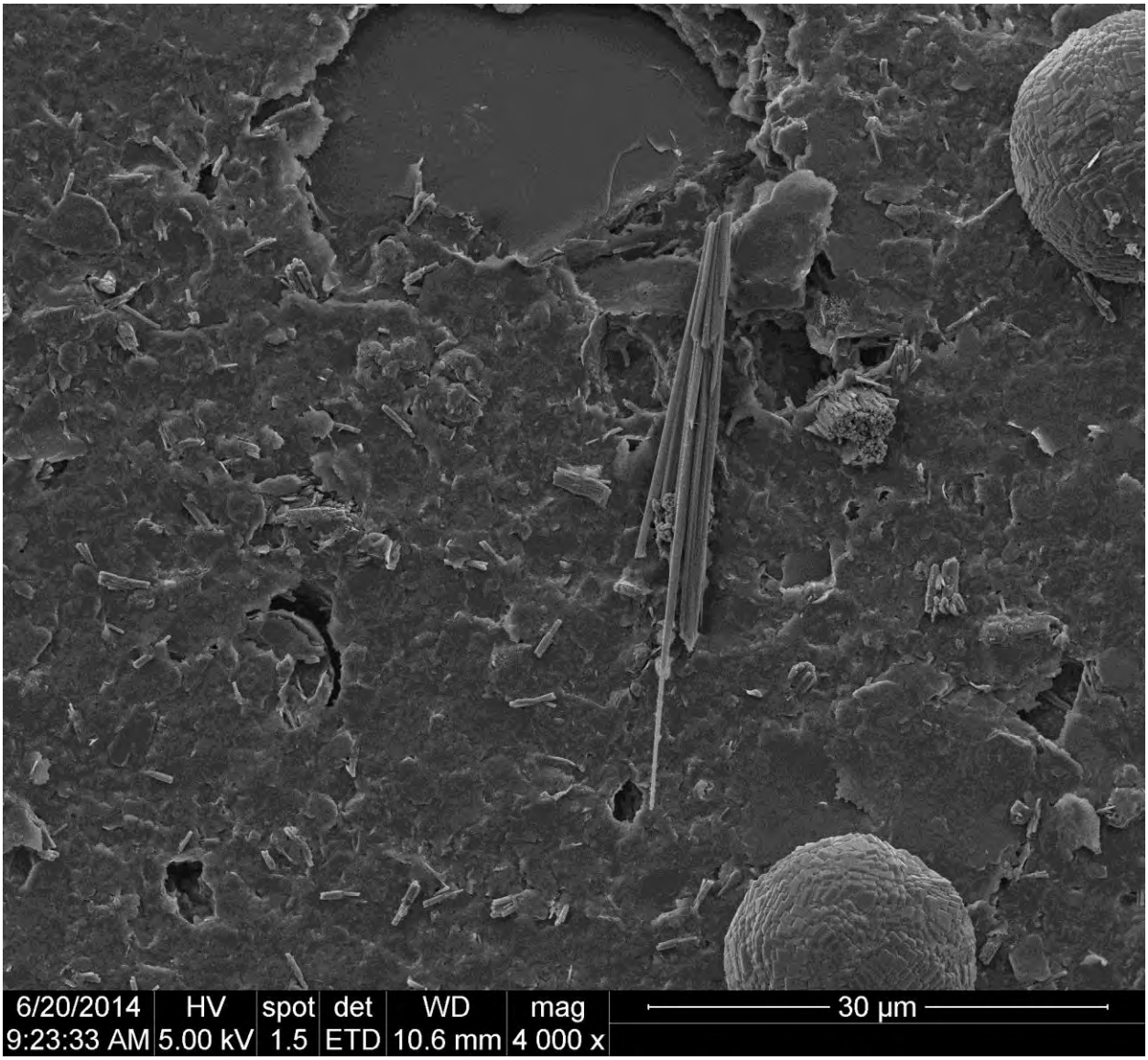
A.15-18. SEM image of possible illite curved spray from EBS 15



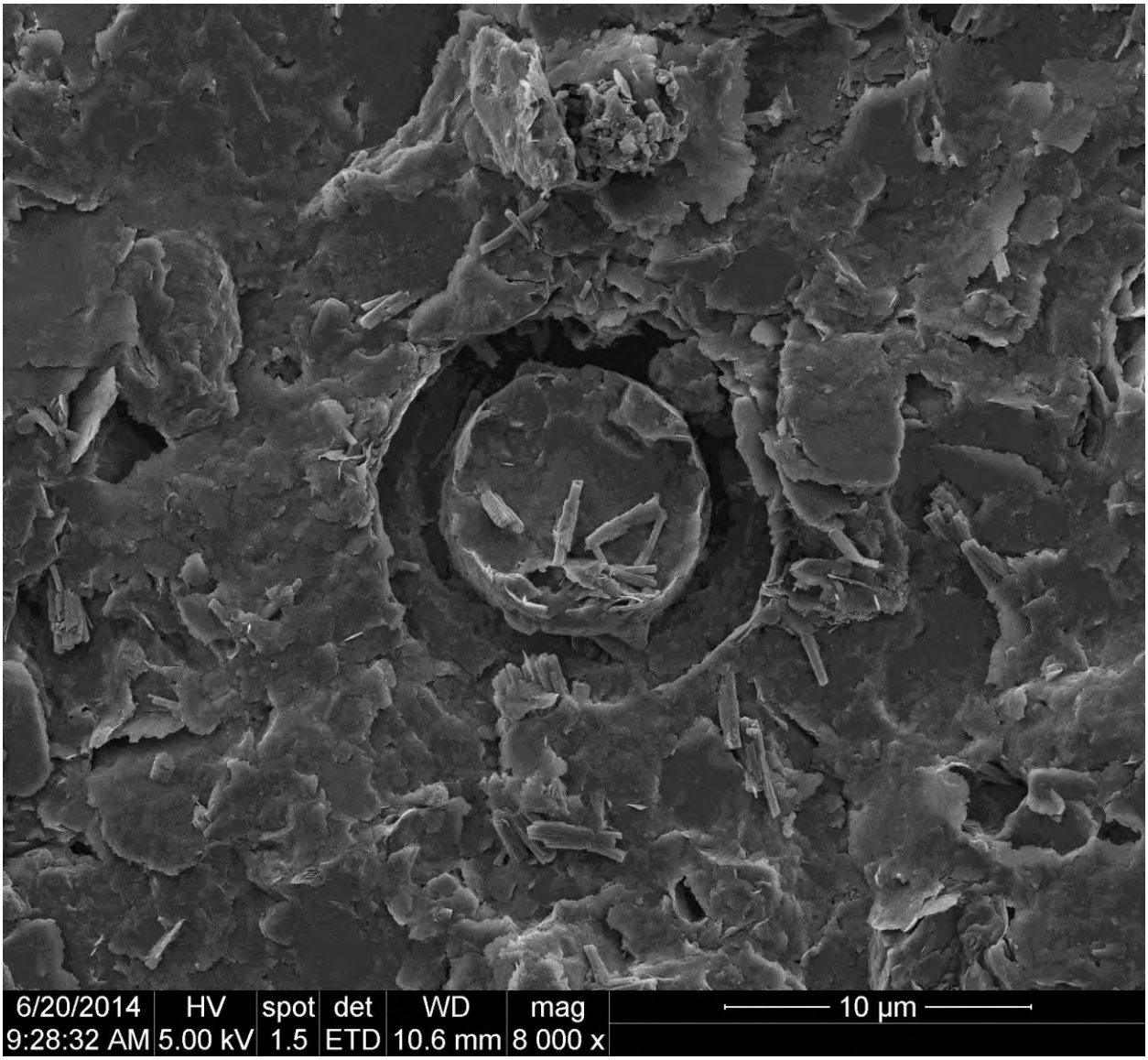
A.15-19. SEM image of smectite matrix with Analcime – Wairakite from EBS 15



A.15-20. SEM image of matrix Opalinus clay with Analcime – Wairakite solid solution from EBS 15

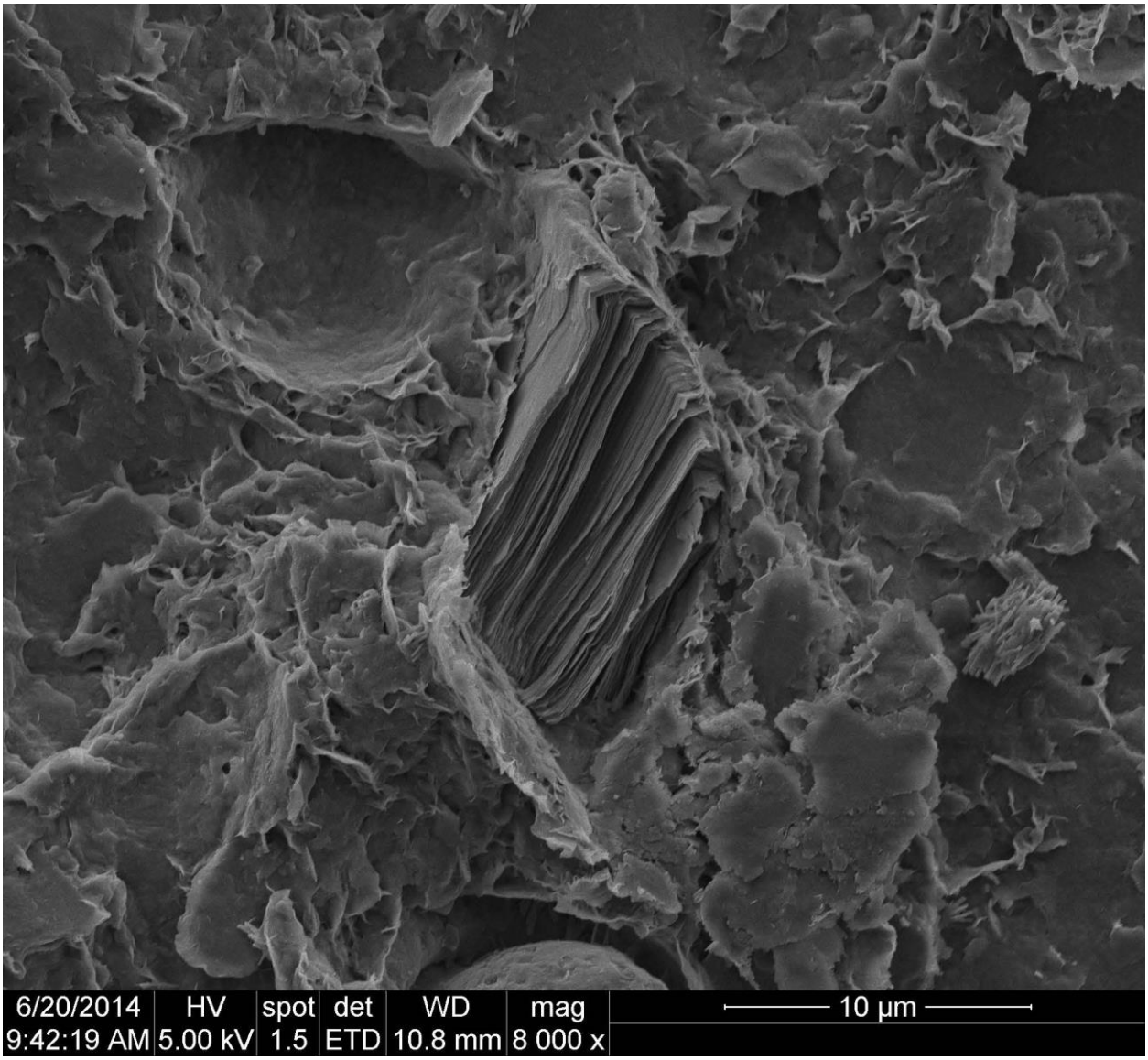


A.15-21. SEM image of fibrous phase with Analcime – Wairakite solid solution from EBS 15

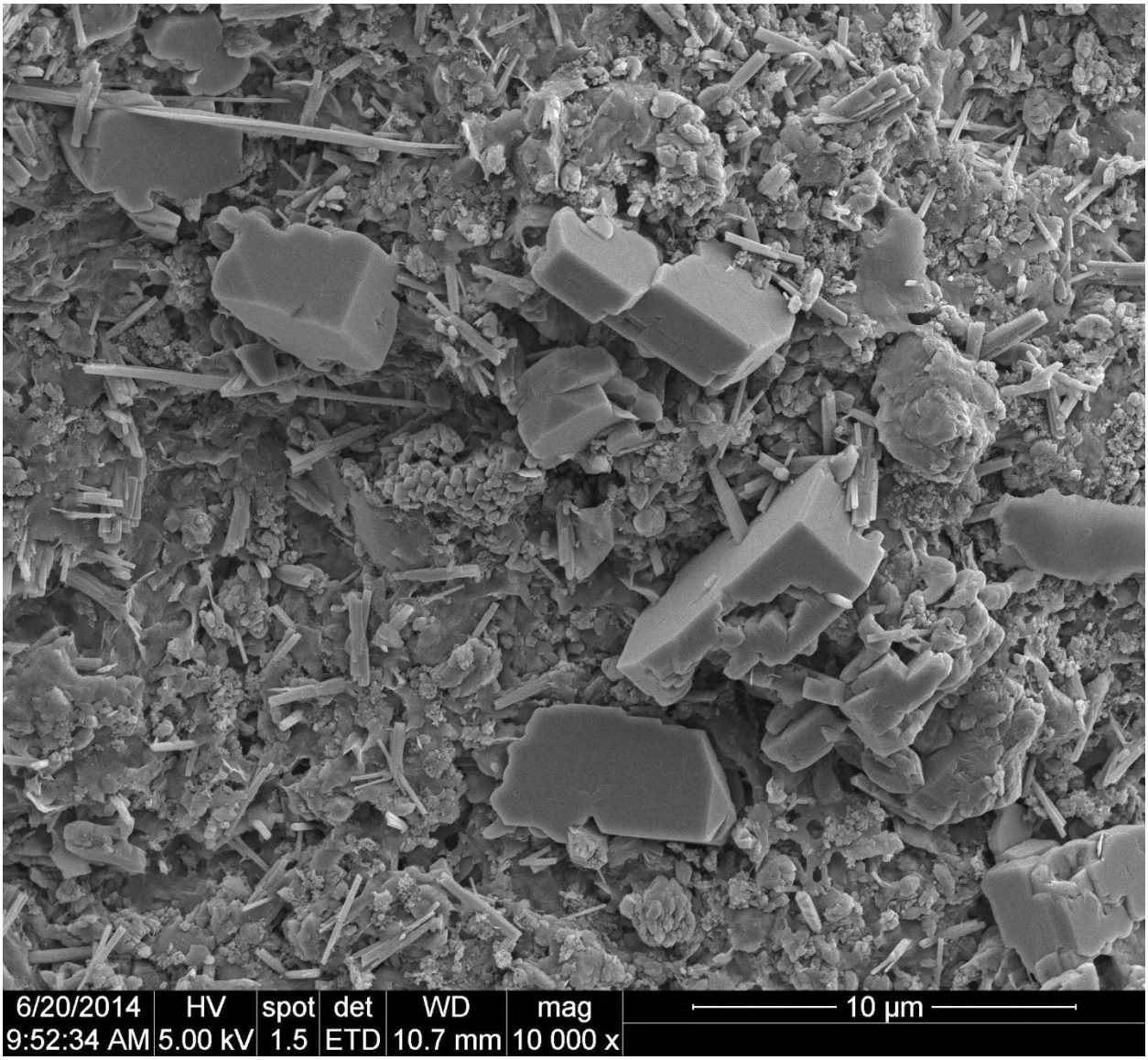


A.15-22. SEM image of fossil cast from EBS 15

A.15-23. SEM image of calcite ball from EBS 15



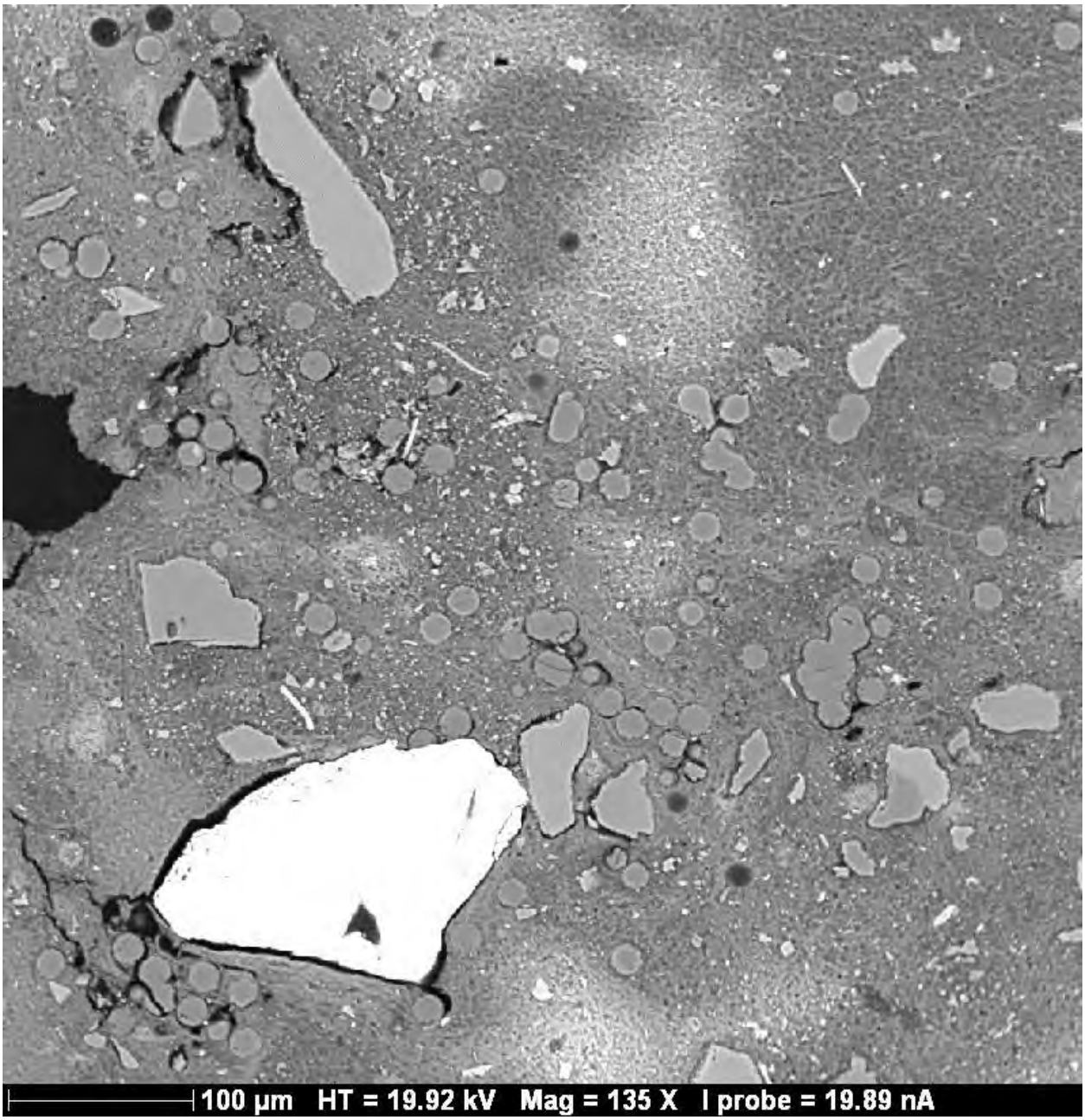
A.15-24. SEM image of biotite from EBS 15



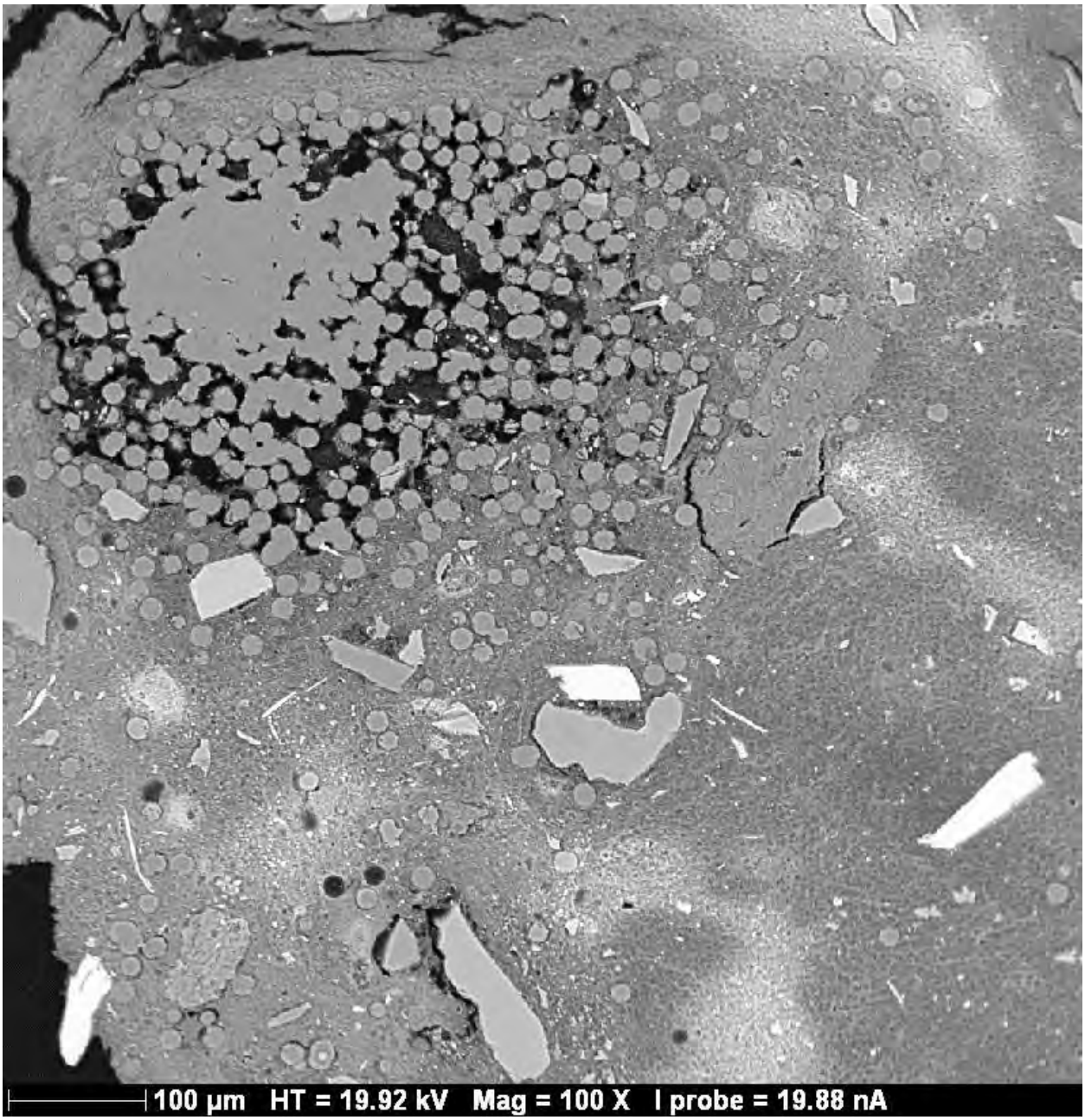
A.15-25. SEM image of unknown new growth crystals

Appendix A.16

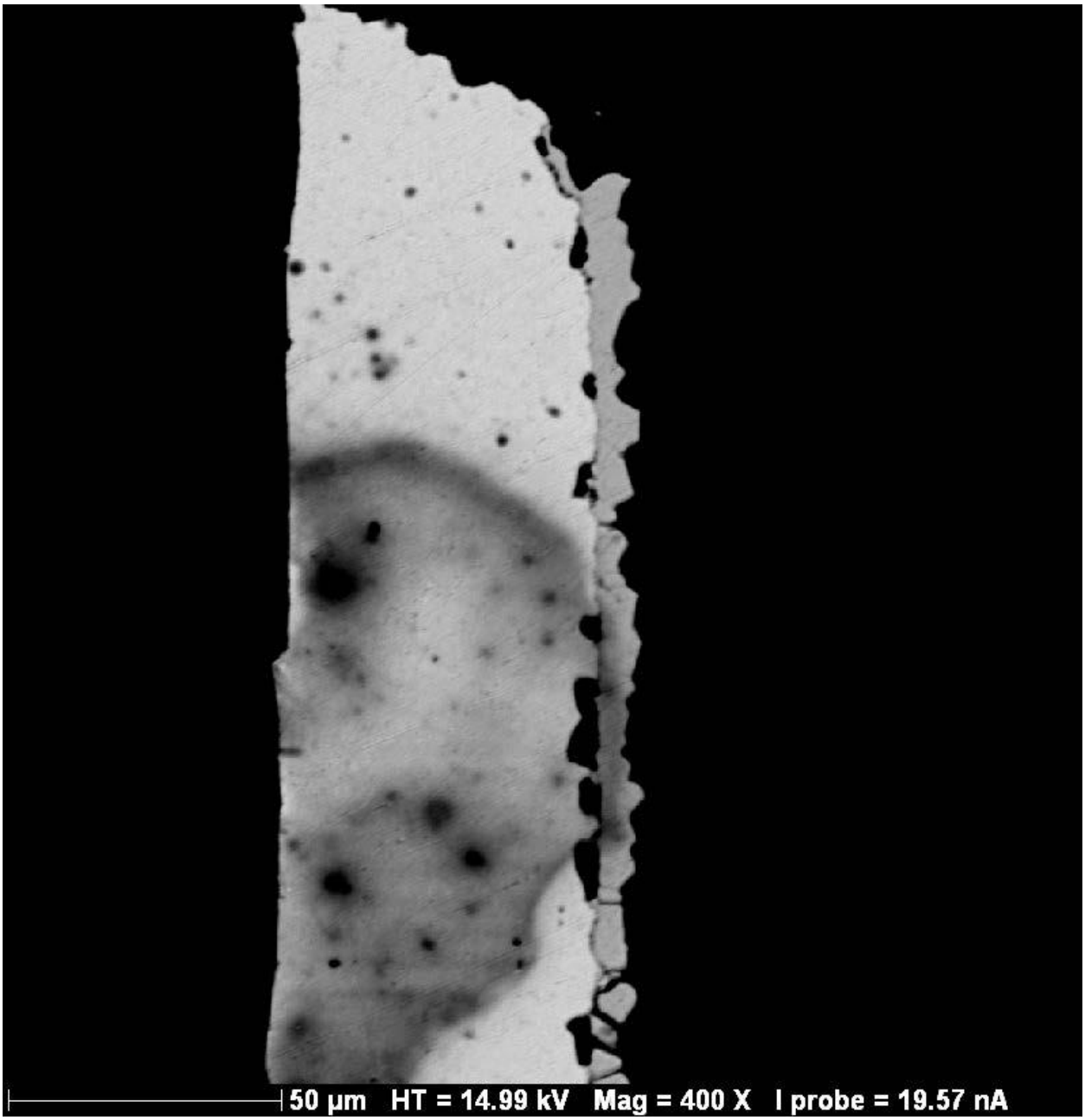
EBS-16 Temperature reduction from 300°C to 120°C and 150 bar for 6 months run with copper



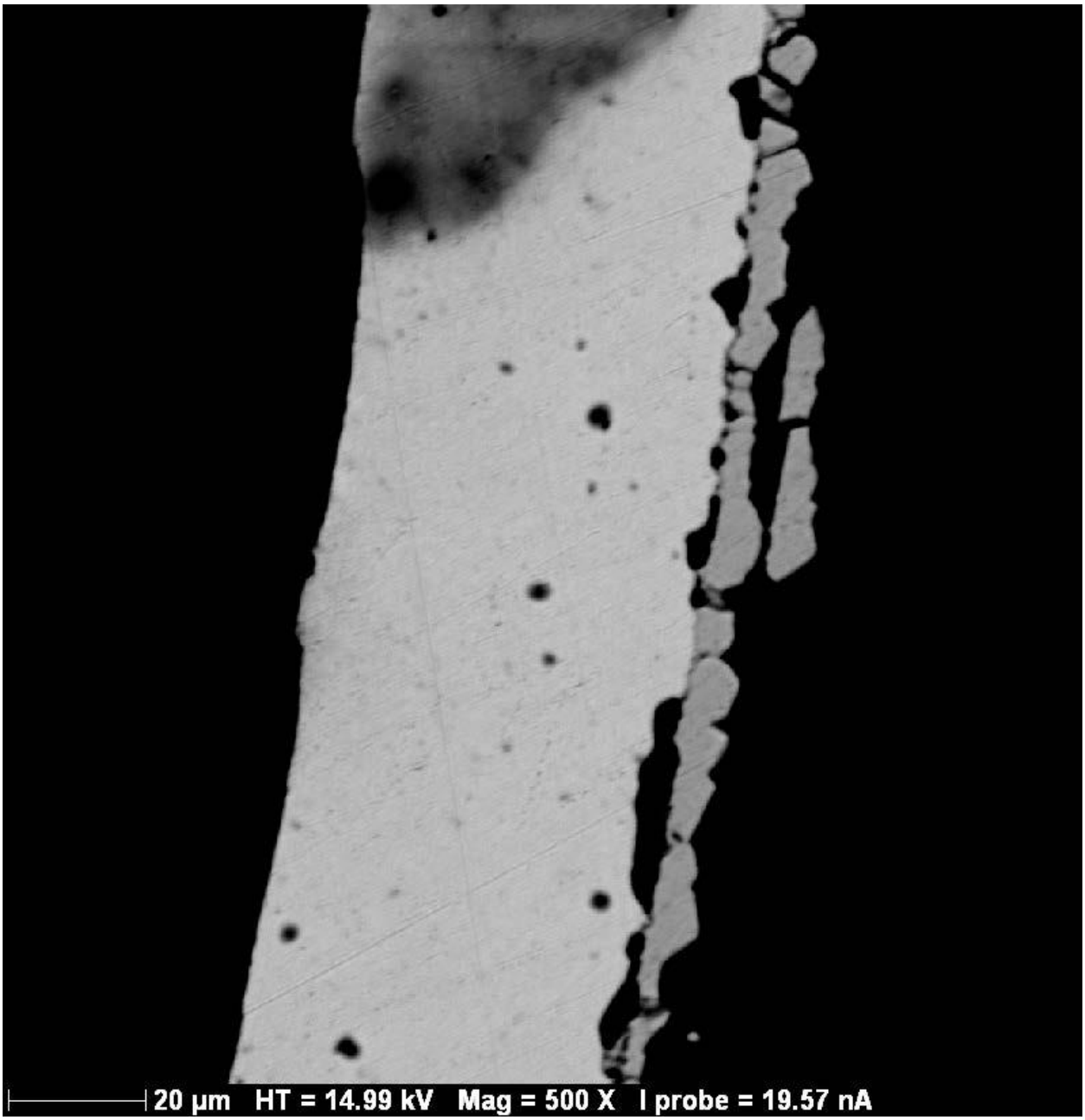
A.16-1: SEM image of EBS 16 thin section. Note abundant Analcime crystals



A.16-2: SEM image of Analcime replacing lapilli from EBS 16



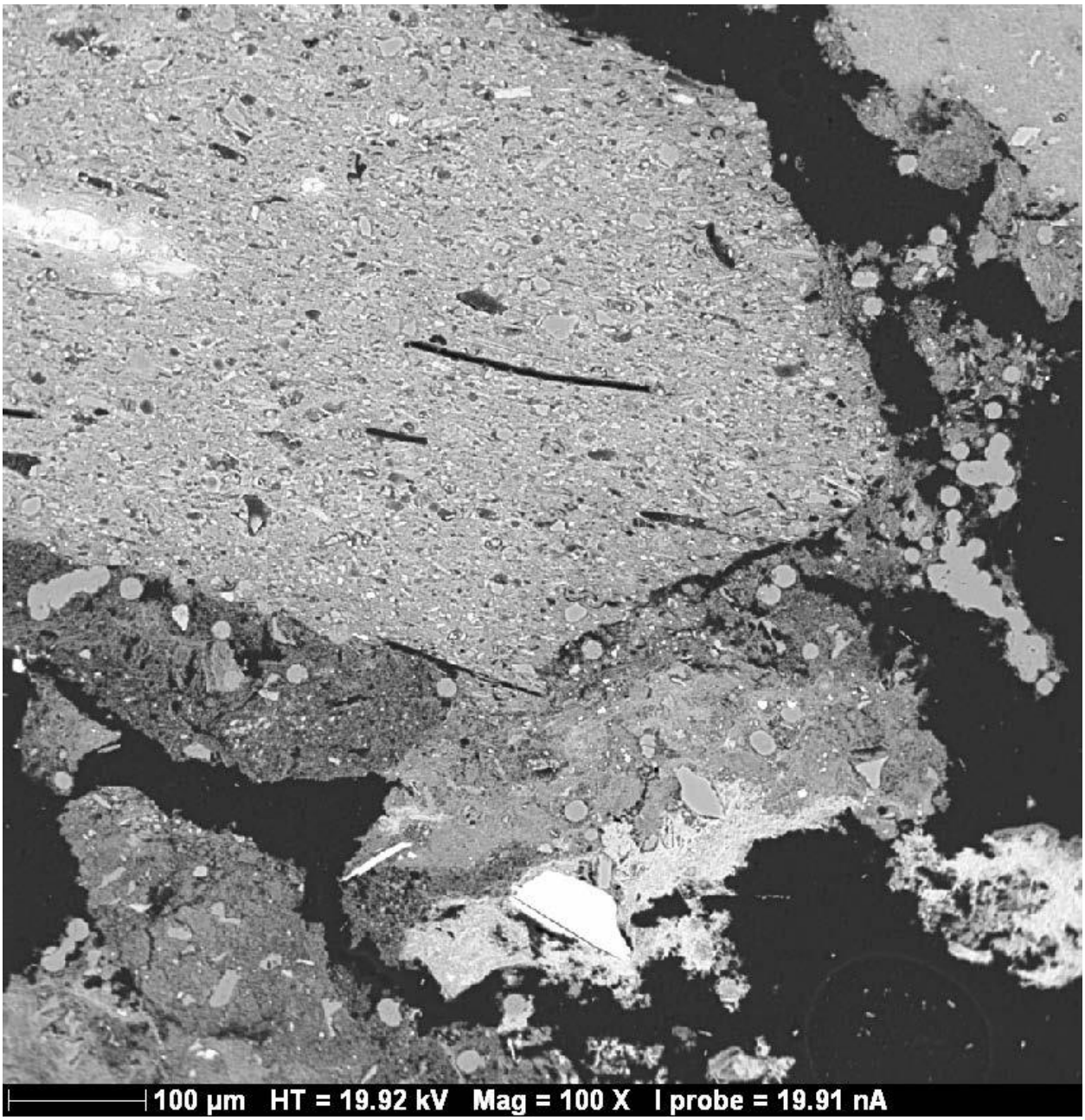
A.16-3: SEM image of EBS 16 copper corrosion. Note pit corrosion and chalcocite overgrowth.



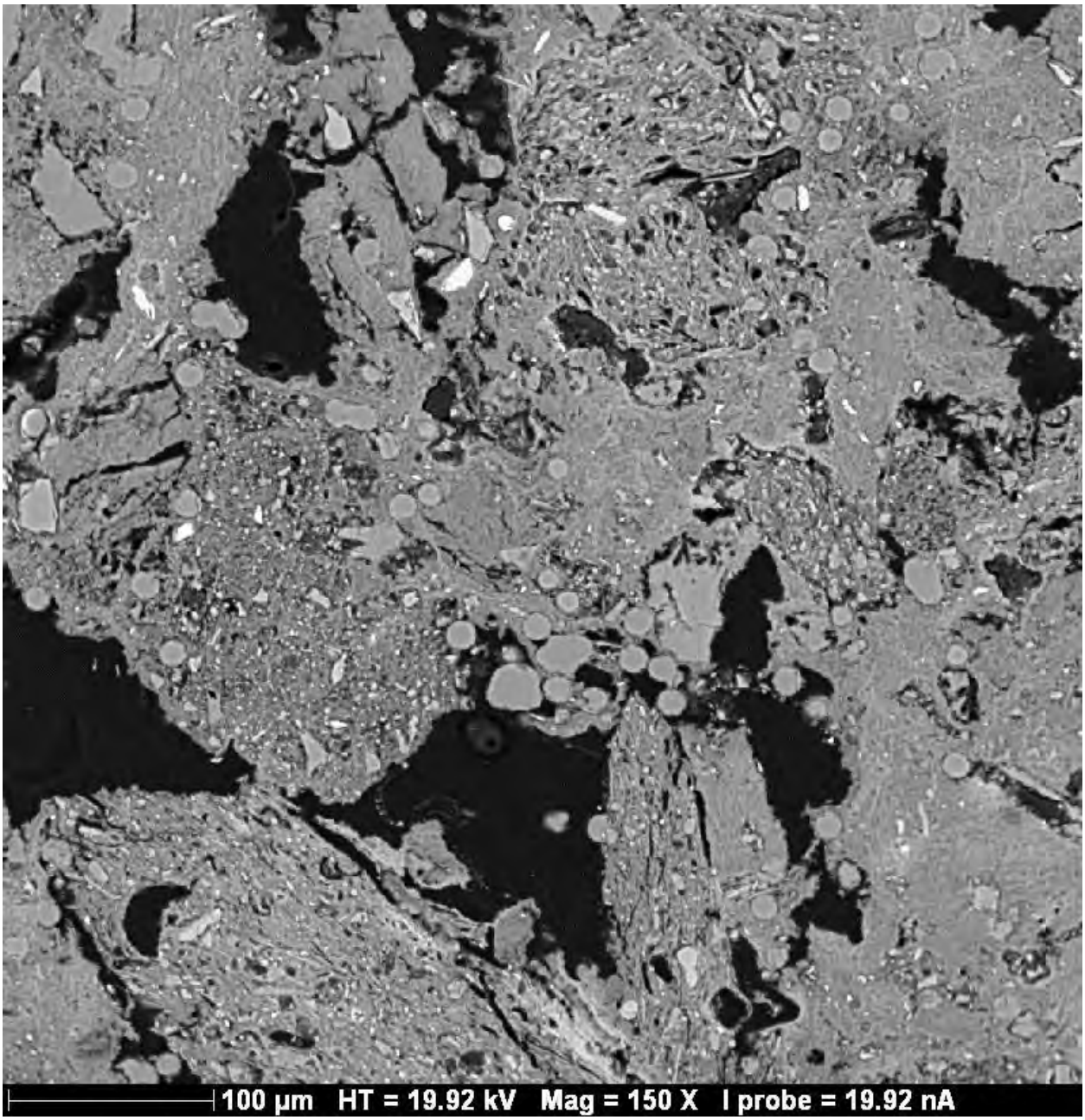
A.16-4: SEM image of EBS 16 copper corrosion. Note pit corrosion and chalcocite overgrowth

Appendix A.17

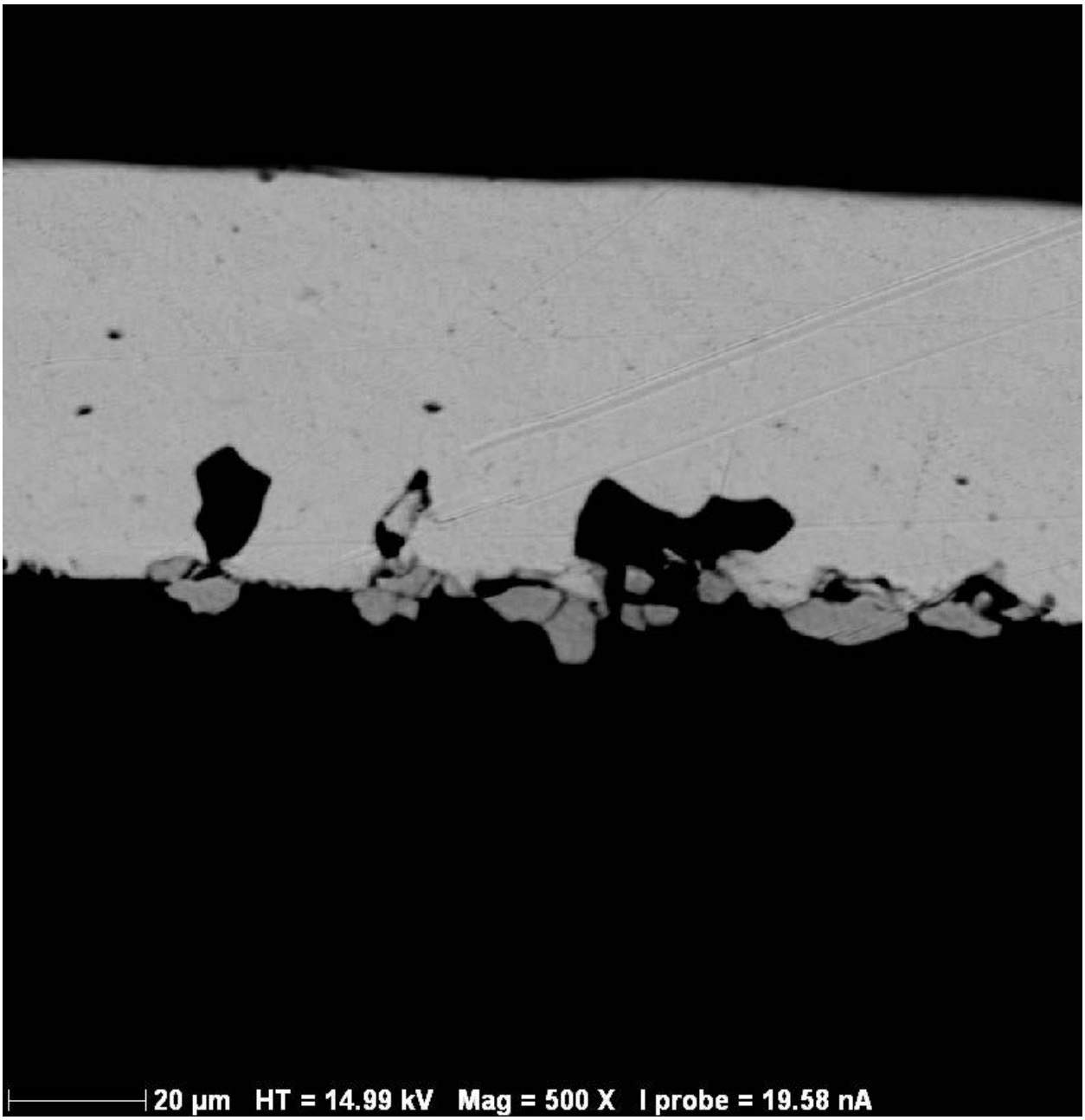
EBS-17 Isothermal at 300°C and 150 bar for 6 weeks run with Opalinus clay and copper



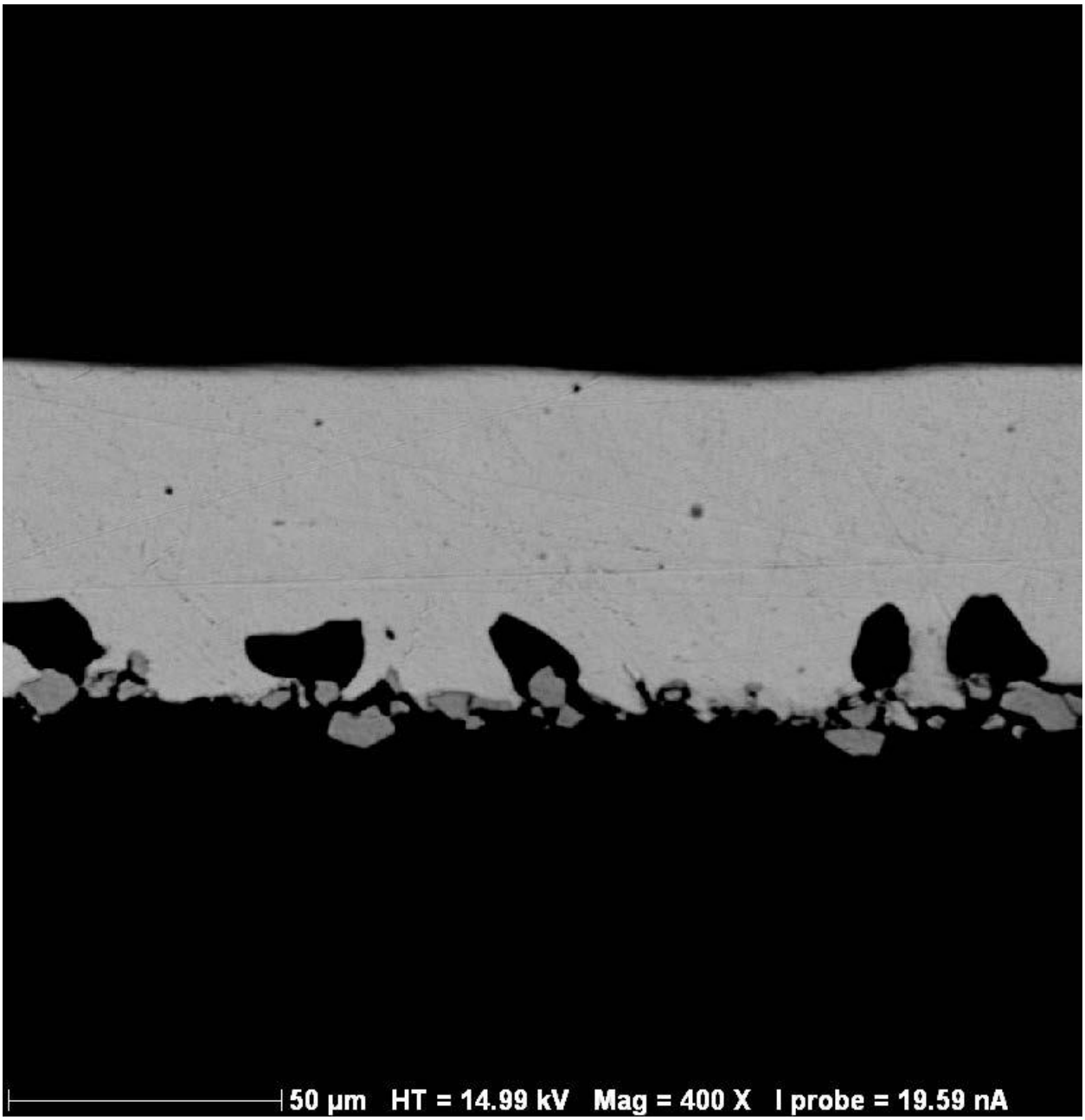
A.17-1. SEM image of Analcime $_{ss}$ crystals around Opalinus chunk



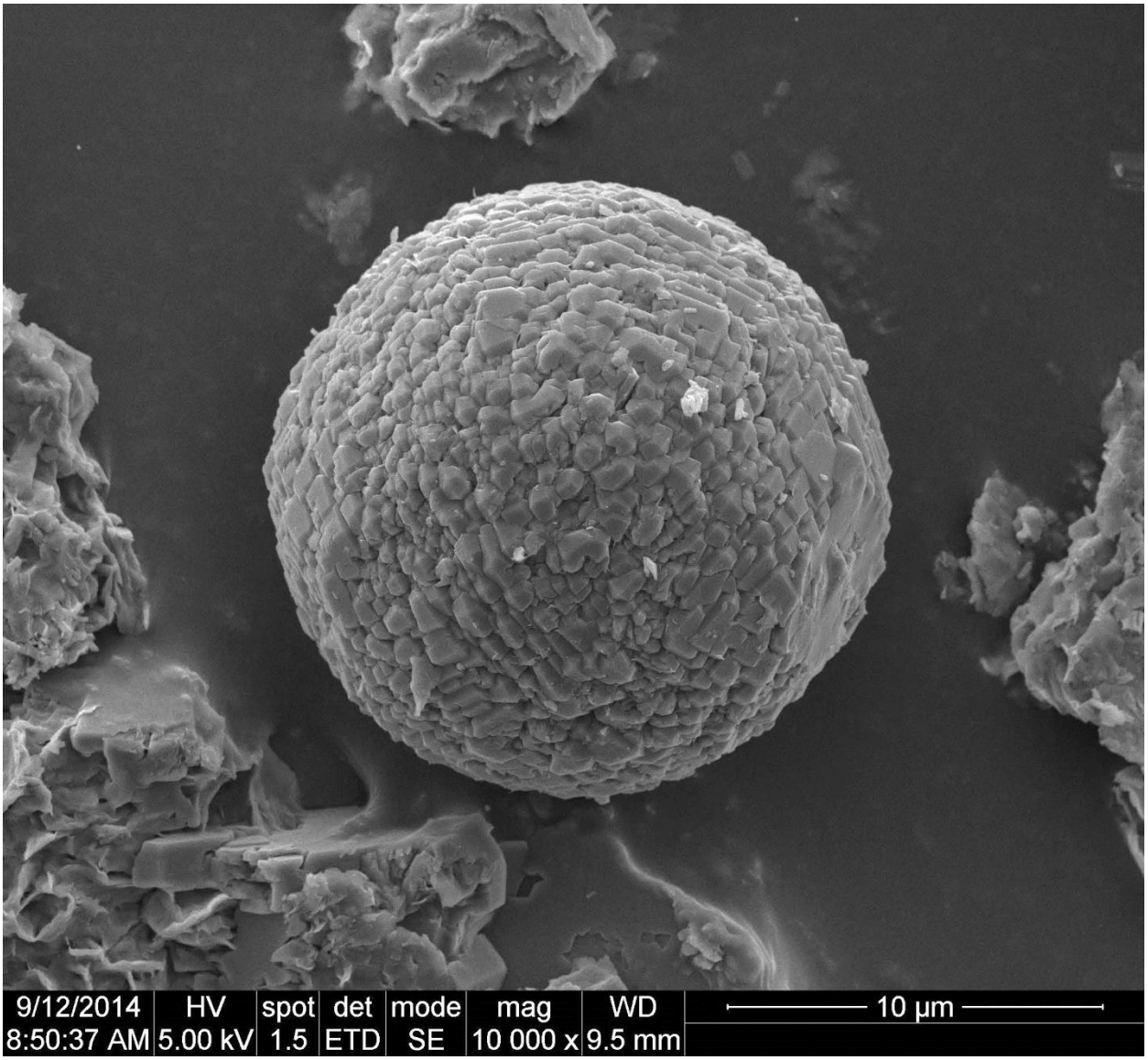
A.17-2. SEM image of Analcime $_{ss}$ crystals around Opalinus chunks



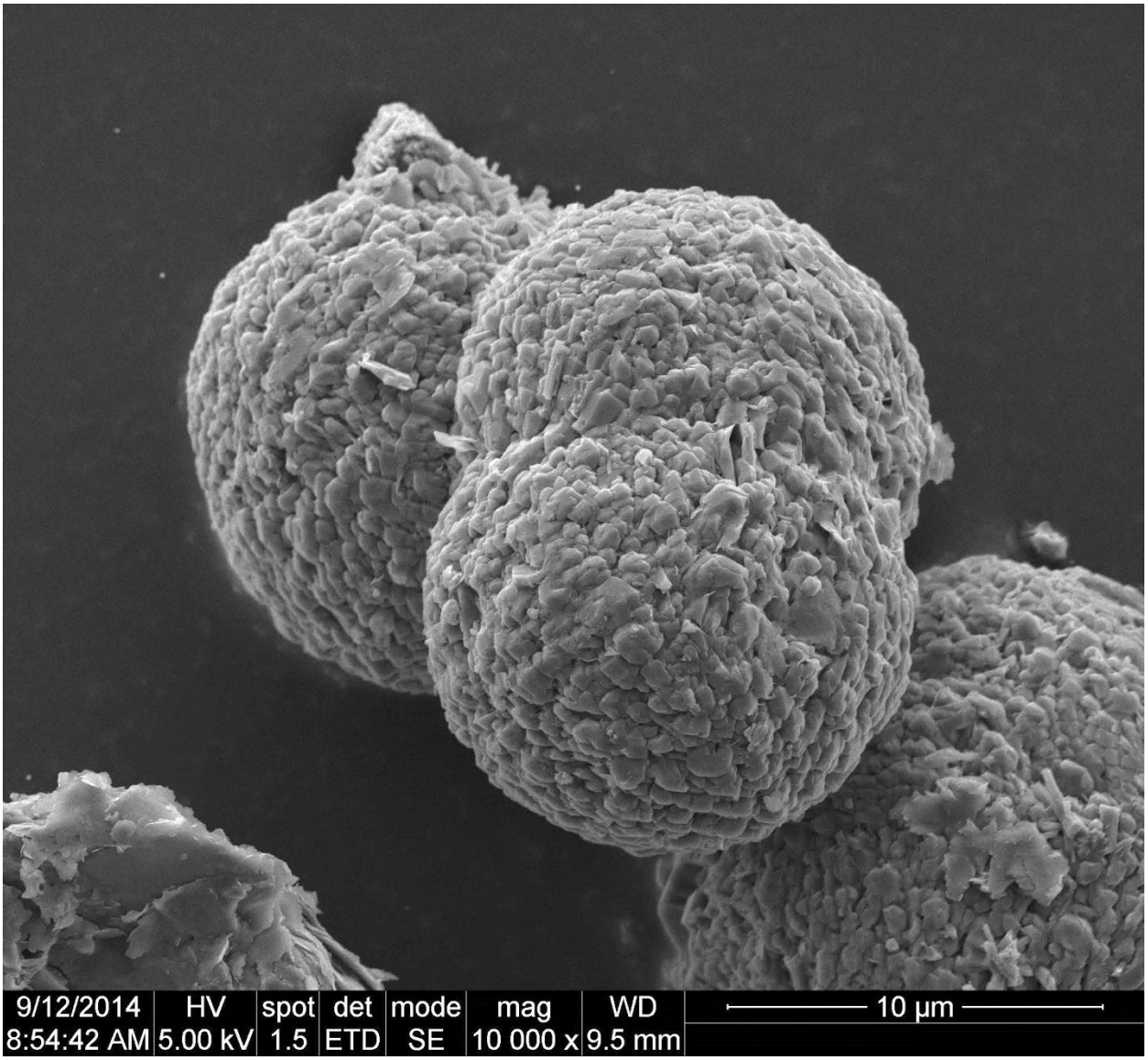
A.17-3. SEM image of EBS 17 pit corrosion



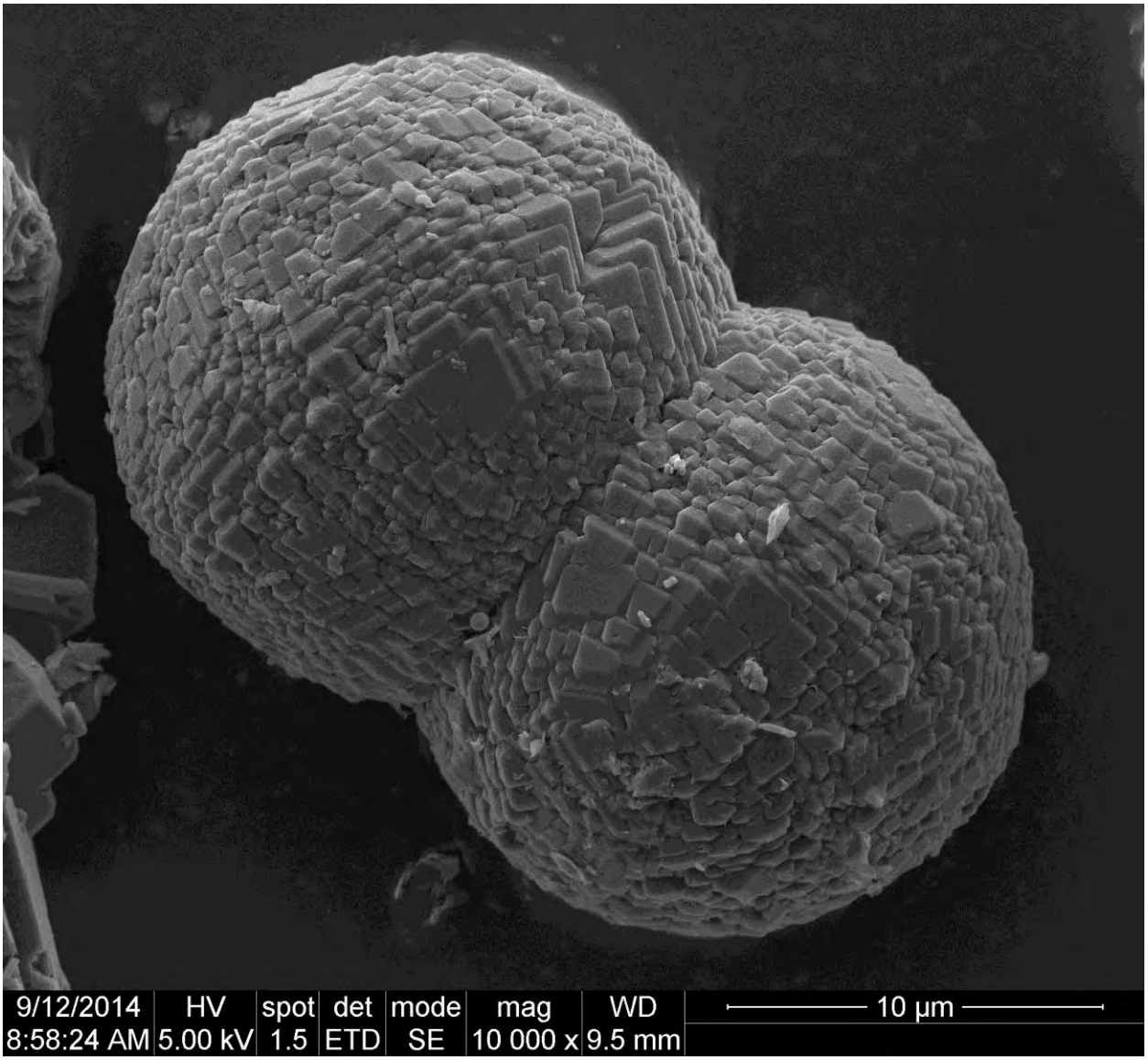
A.17-4. SEM image of pit corrosion in copper from EBS 17



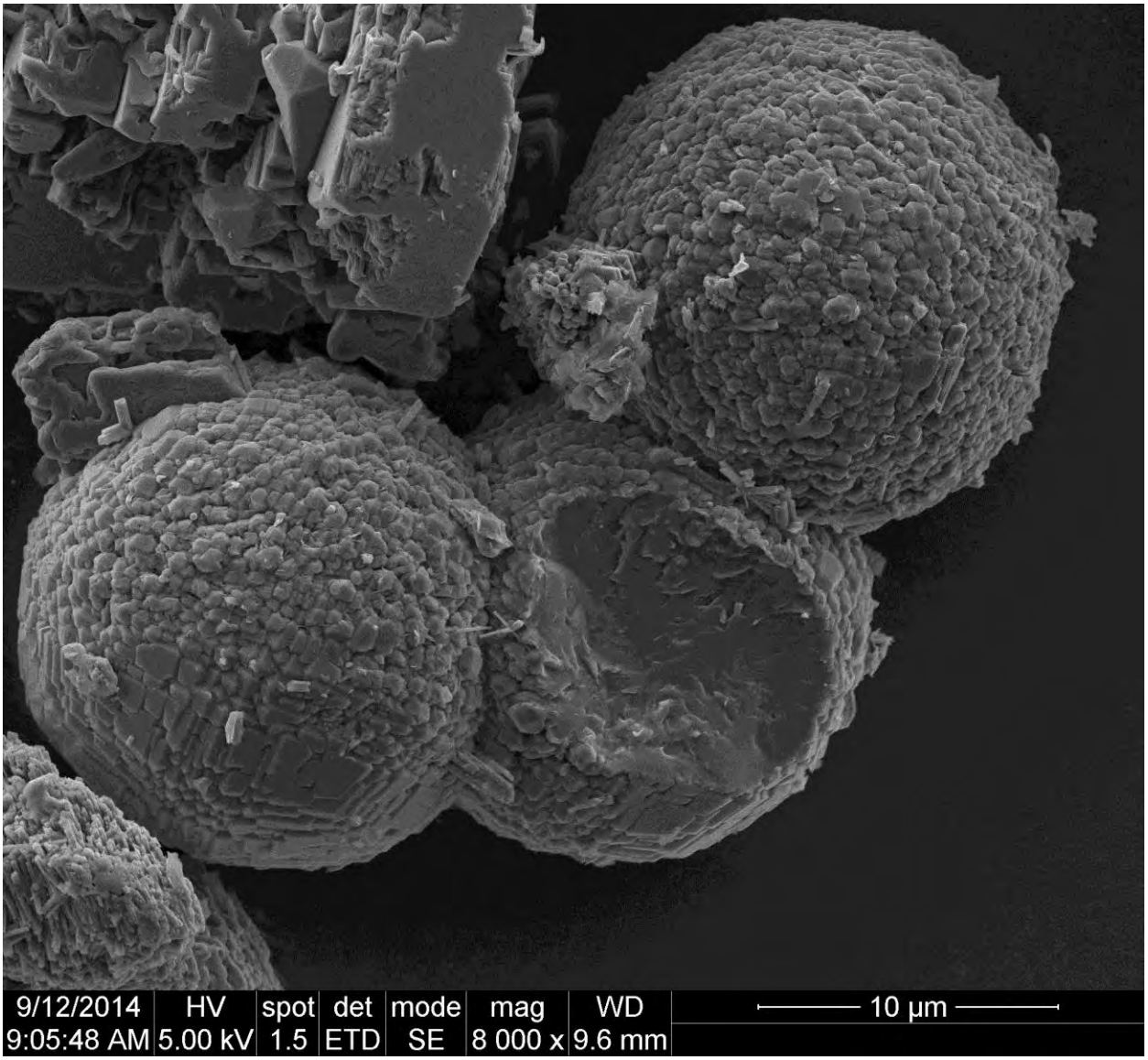
A.17-5. SEM image of single Analcime – Wairakite solid solution sphere



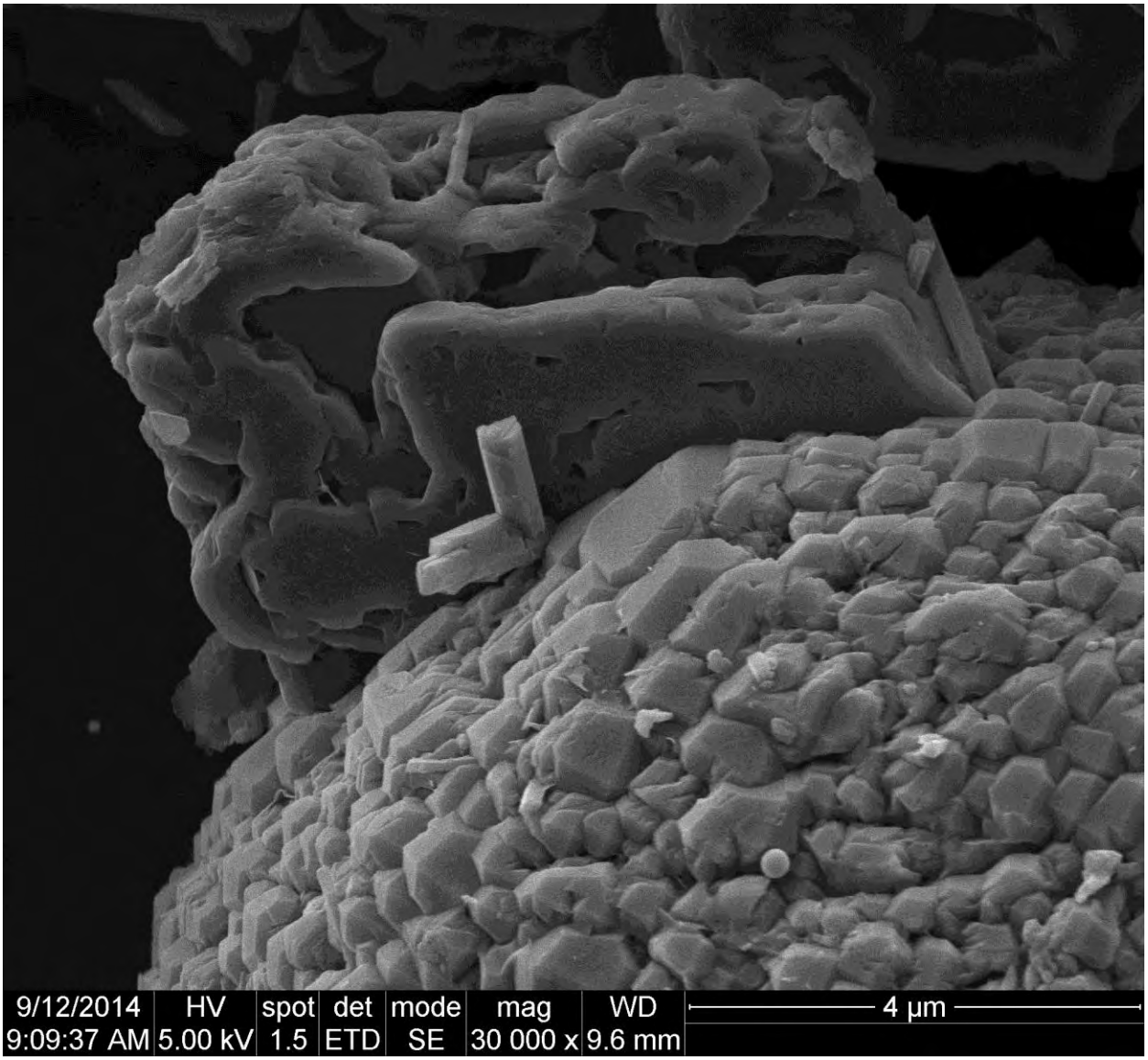
A.17-6: SEM image of triple group of Analcime – Wairakite solid solution spheres from EBS 17



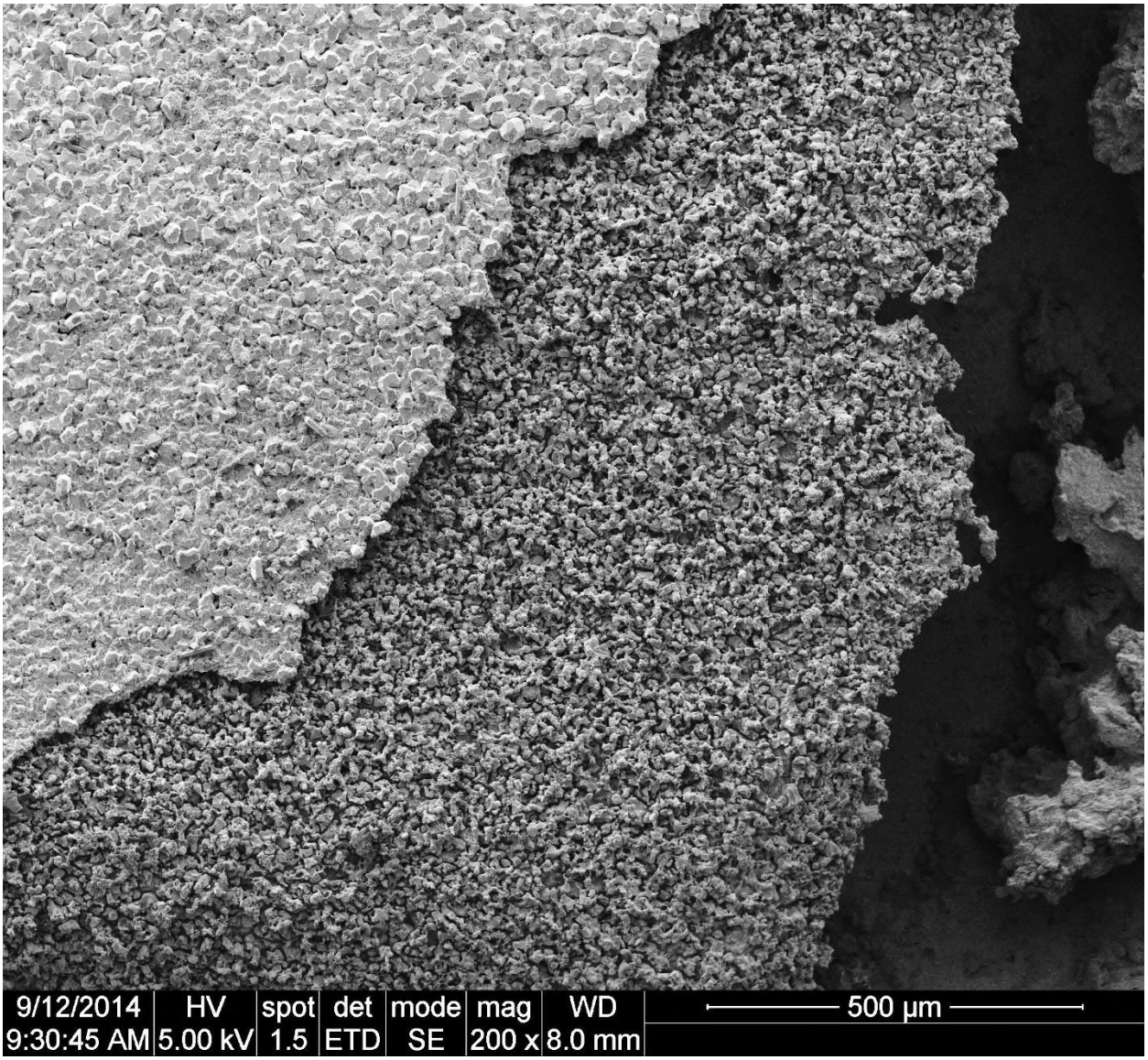
A.17-7: SEM image of double Analcime – Wairakite solid solution spheres from EBS 17



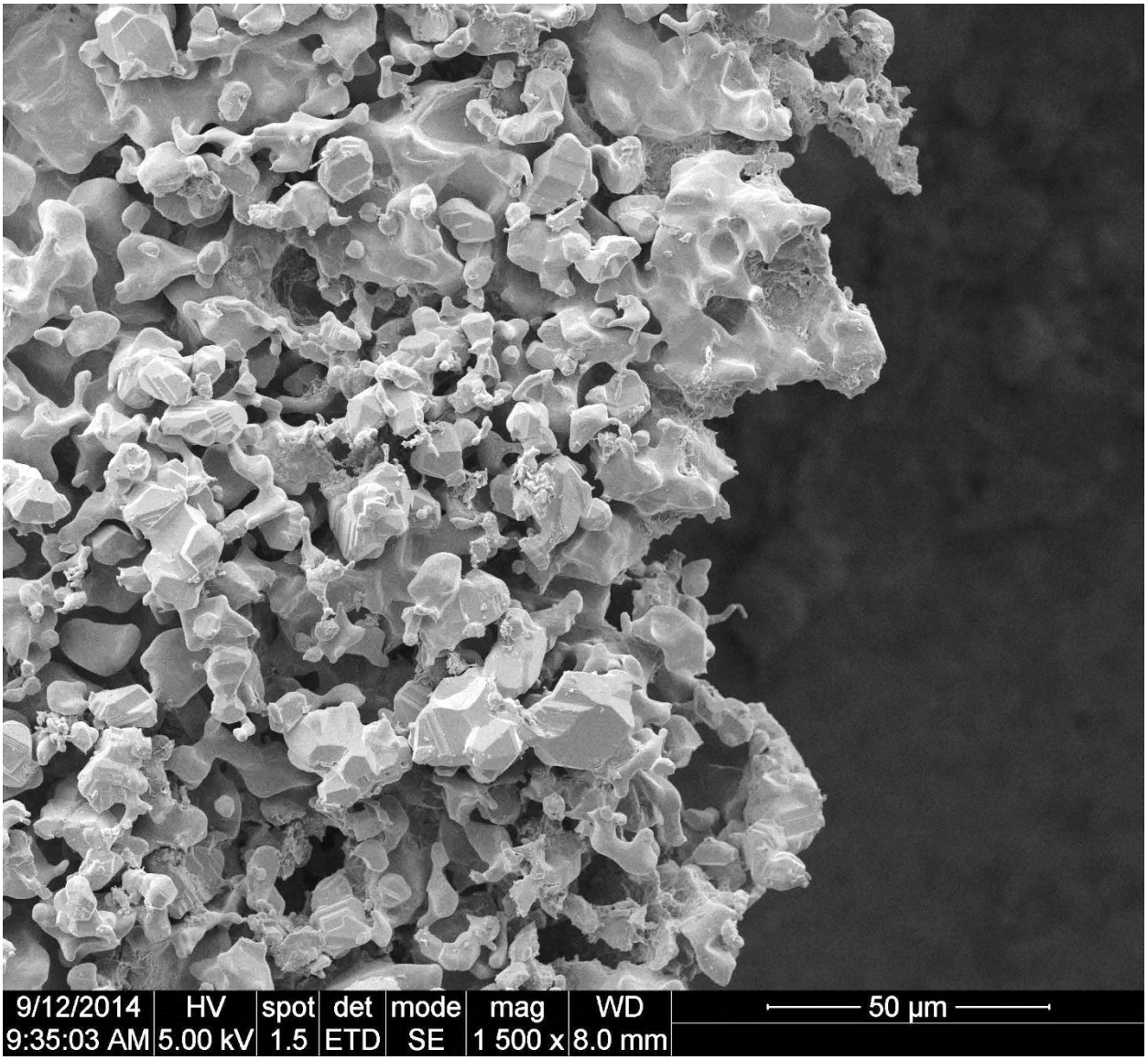
A.17-8: SEM image of multiple Analcime – Wairakite solid solution spheres from EBS 17



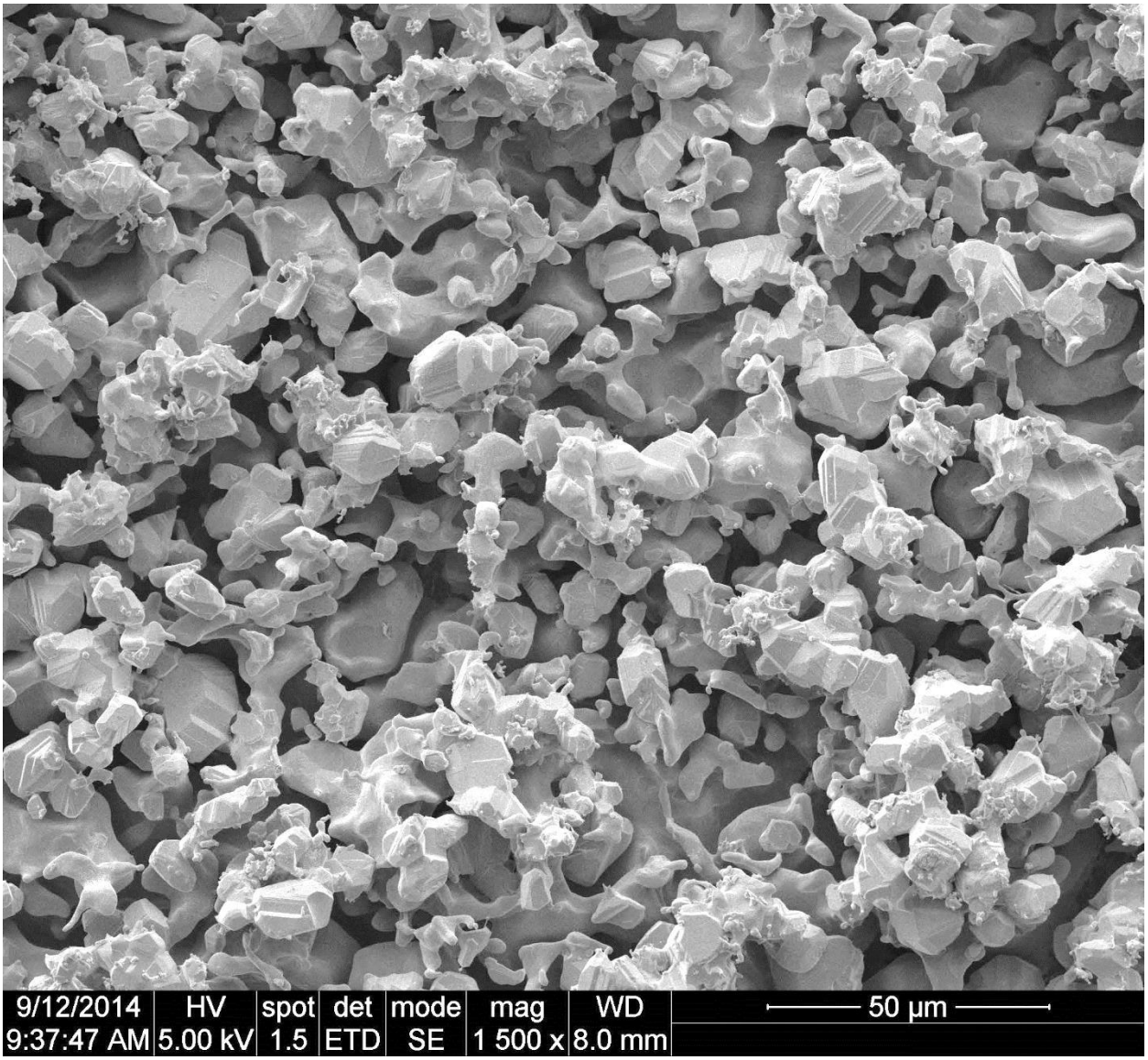
A.17-9: SEM image of feldspar dissolution in contact with Analcime – Wairakite solid solution from EBS 17



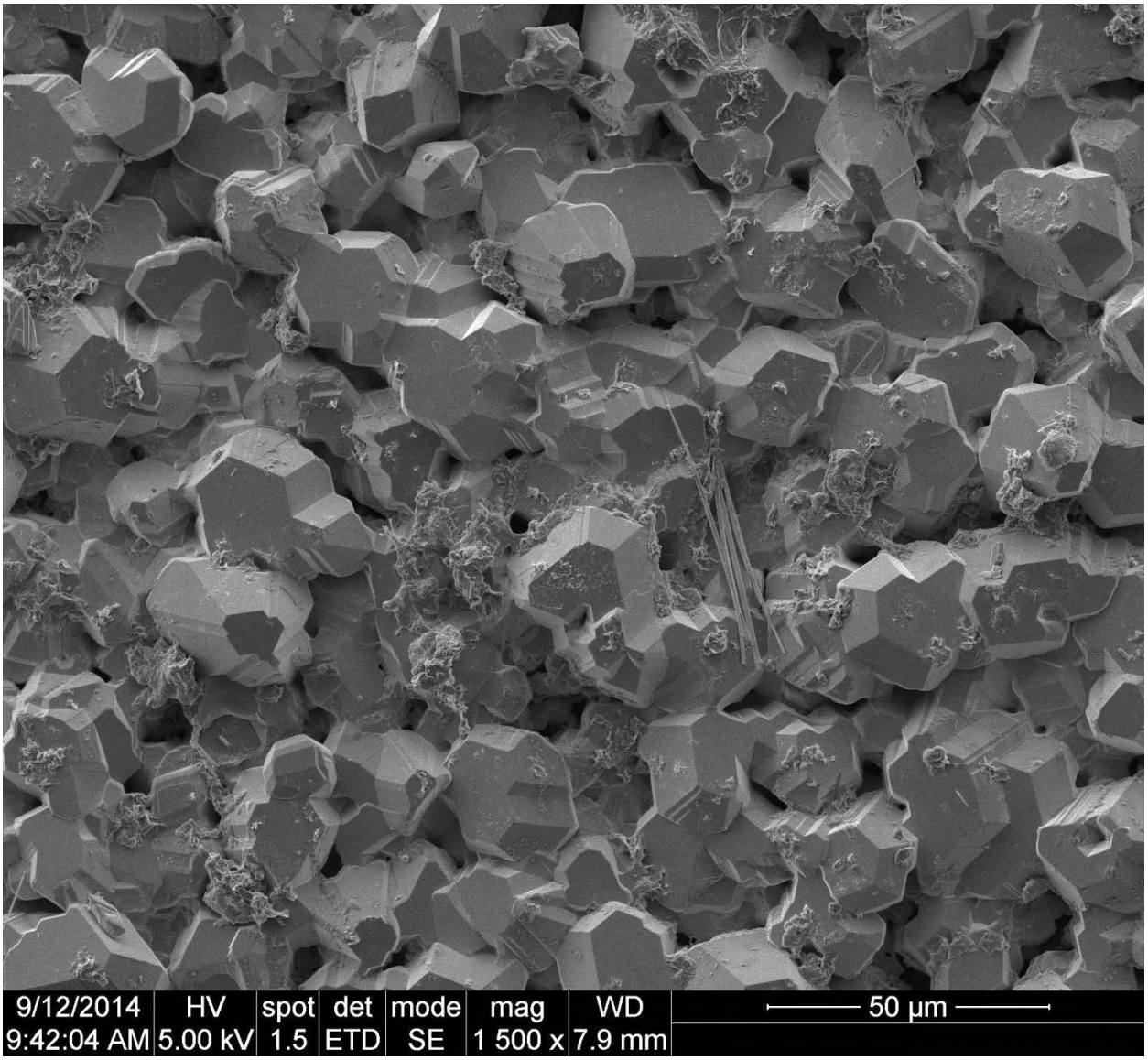
A.17-10: SEM image of corroded copper (right) and chalcocite overgrowth



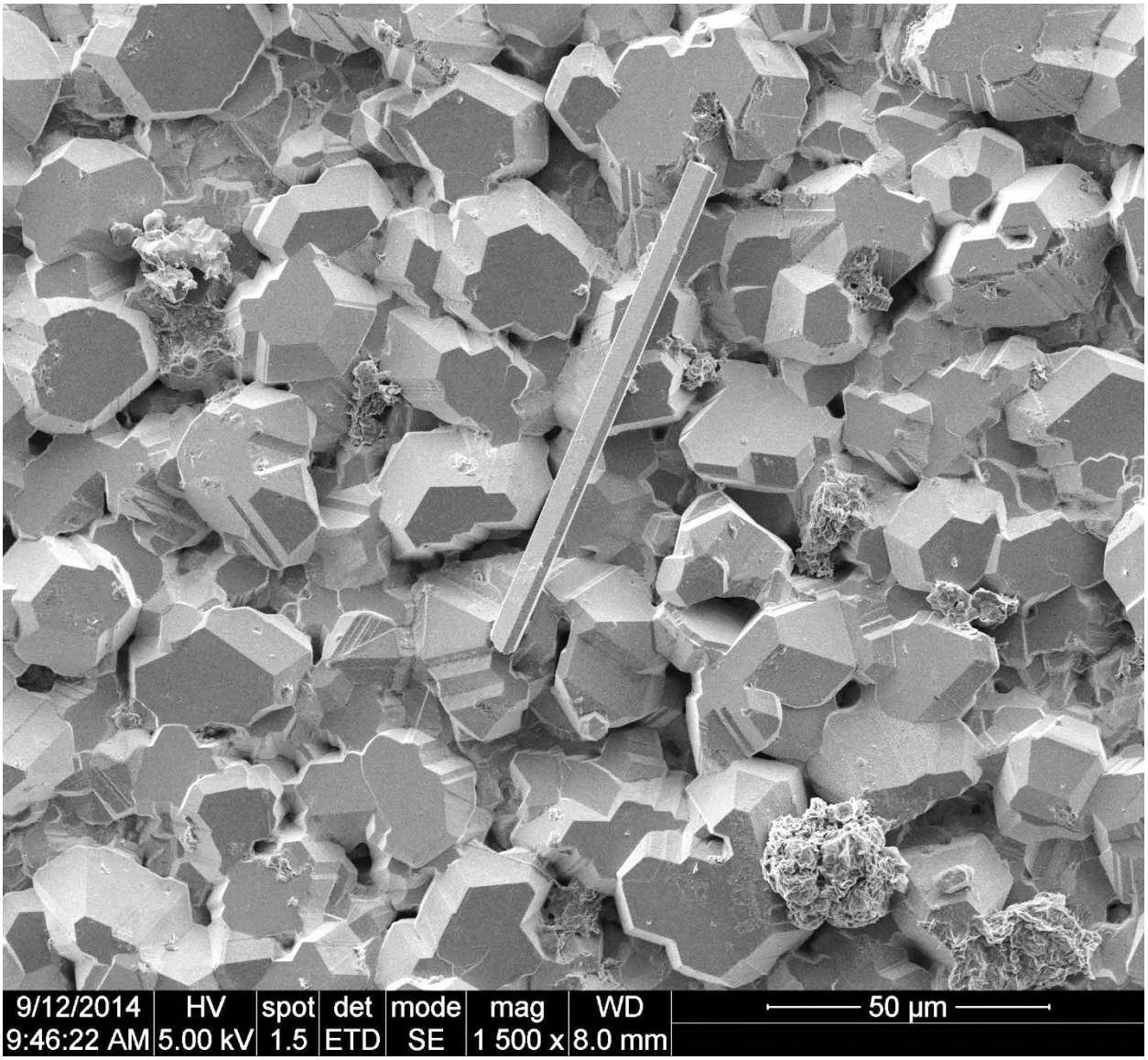
A.17-11: SEM image of mostly corroded copper from EBS 17



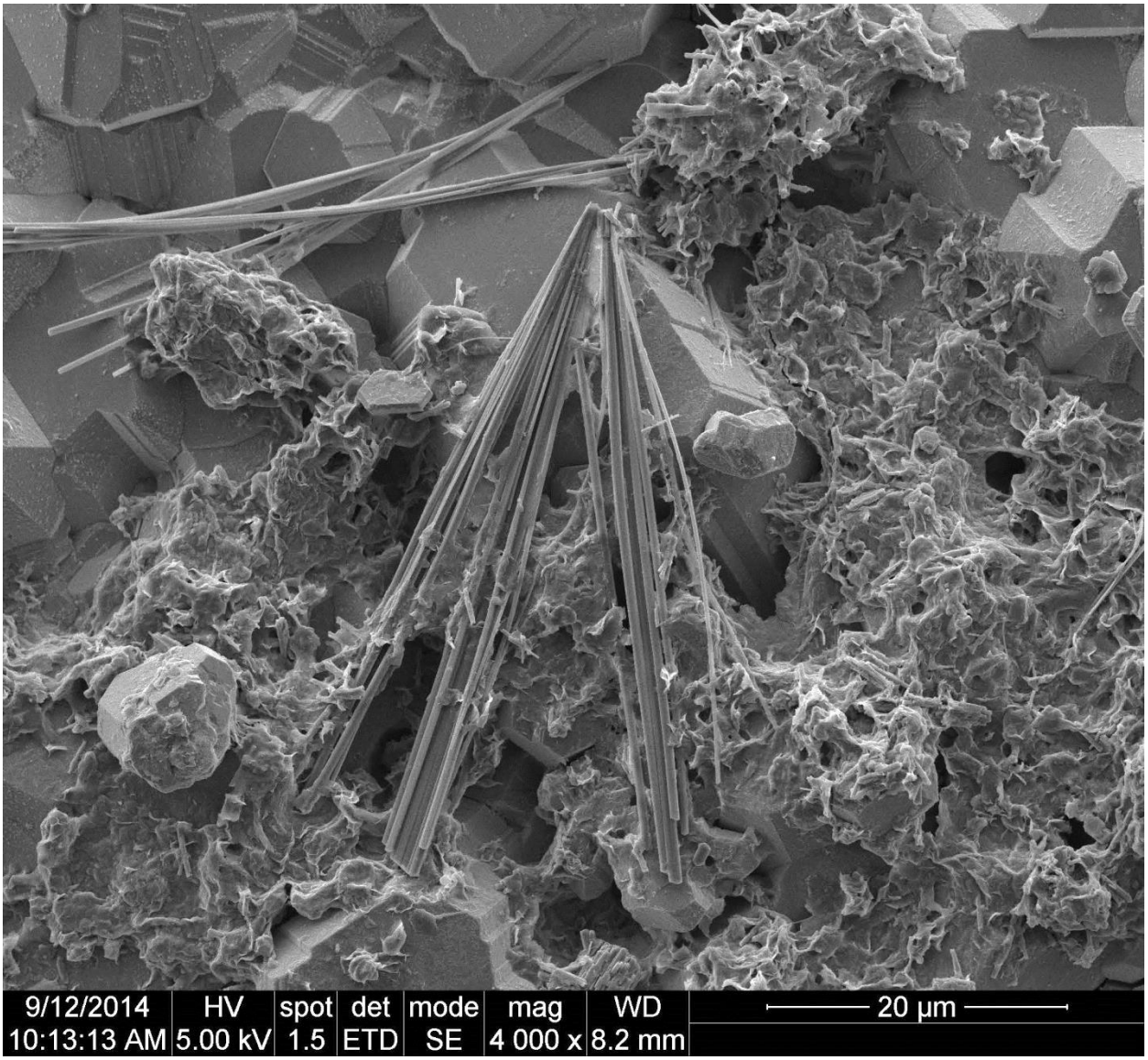
A.17-12: SEM image of porous chalcocite cover from EBS 17



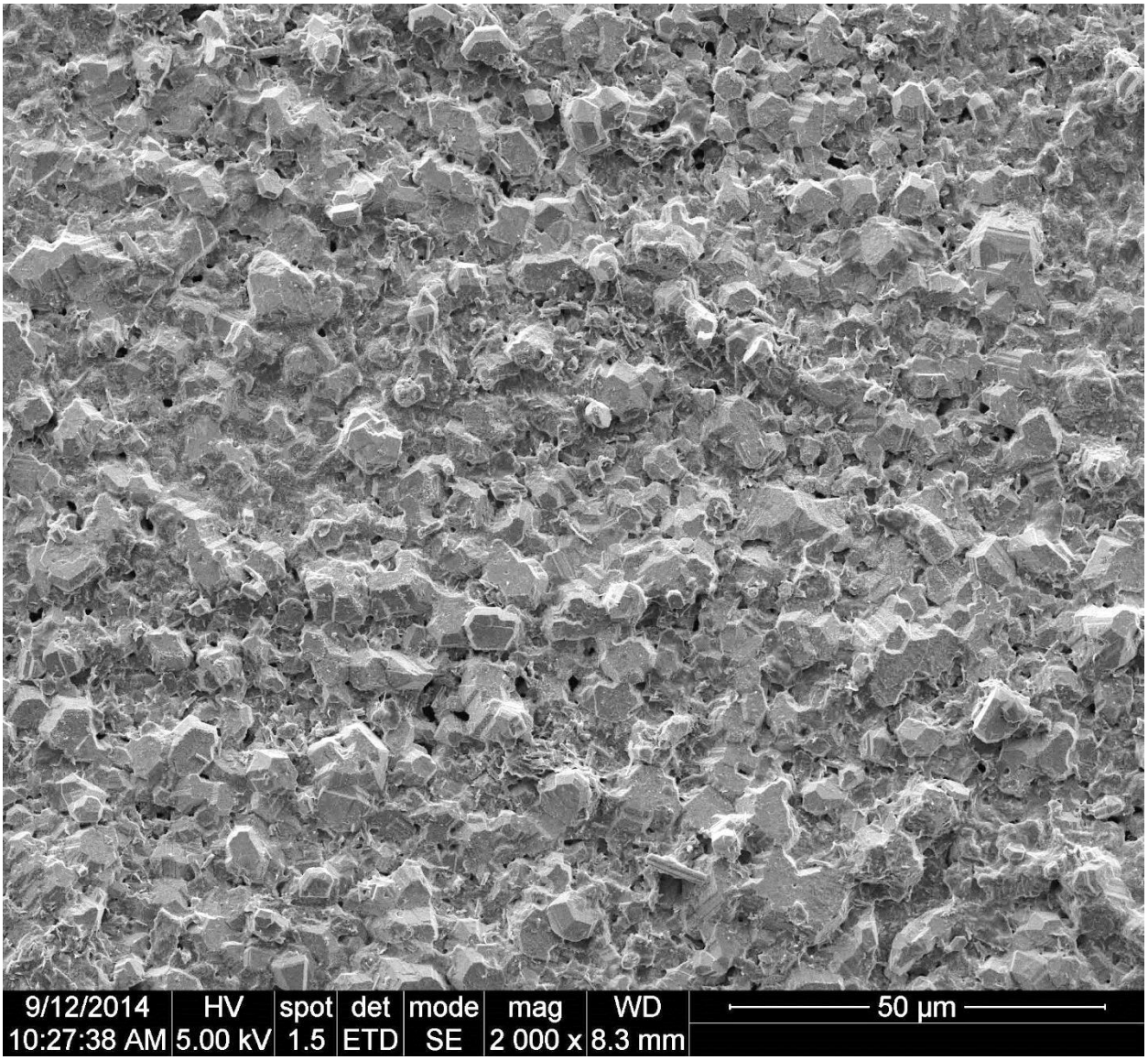
A.17-13: SEM image of chalcocite mat from EBS 17



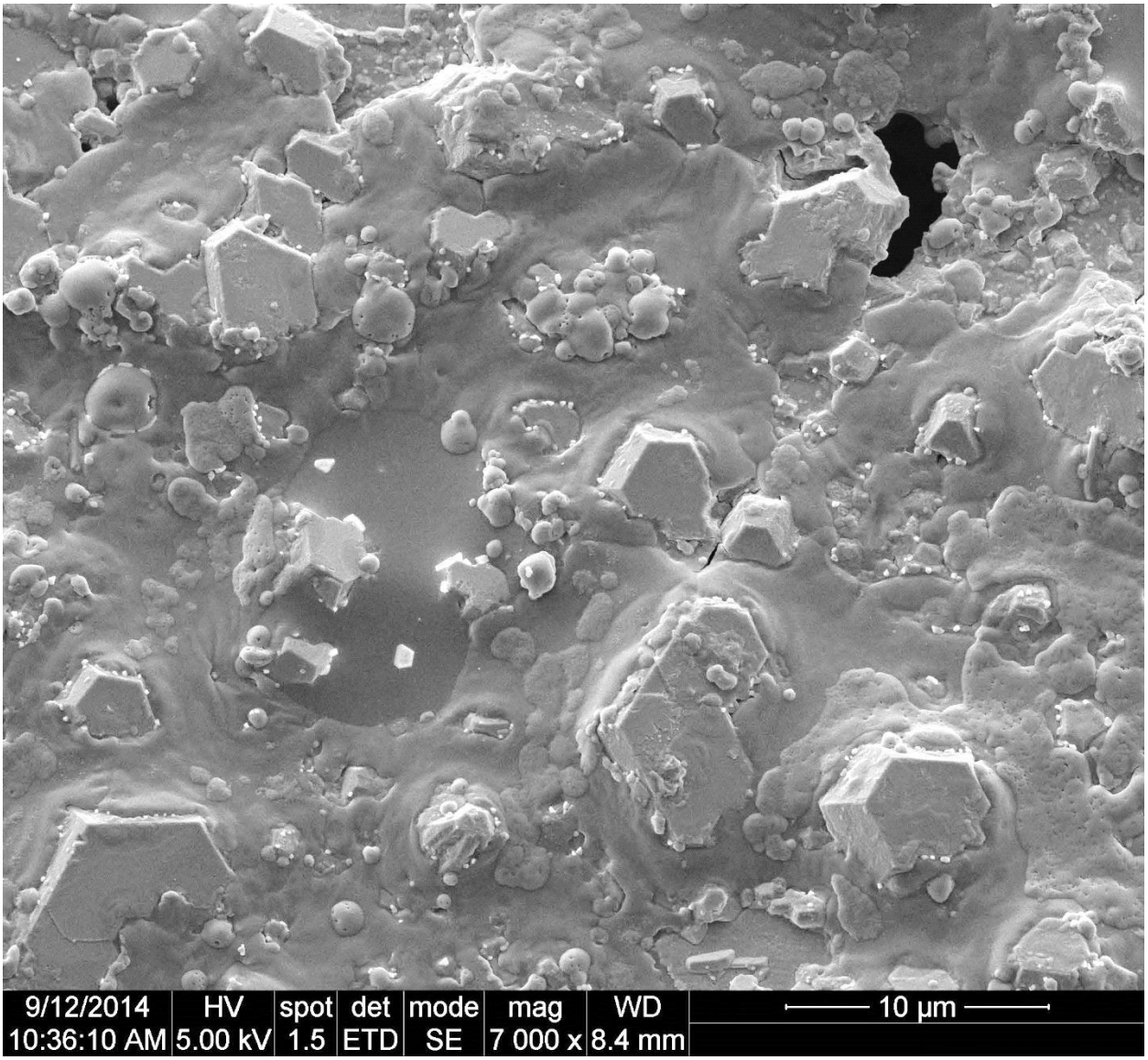
A.17-14: SEM image of chalcocite with ?



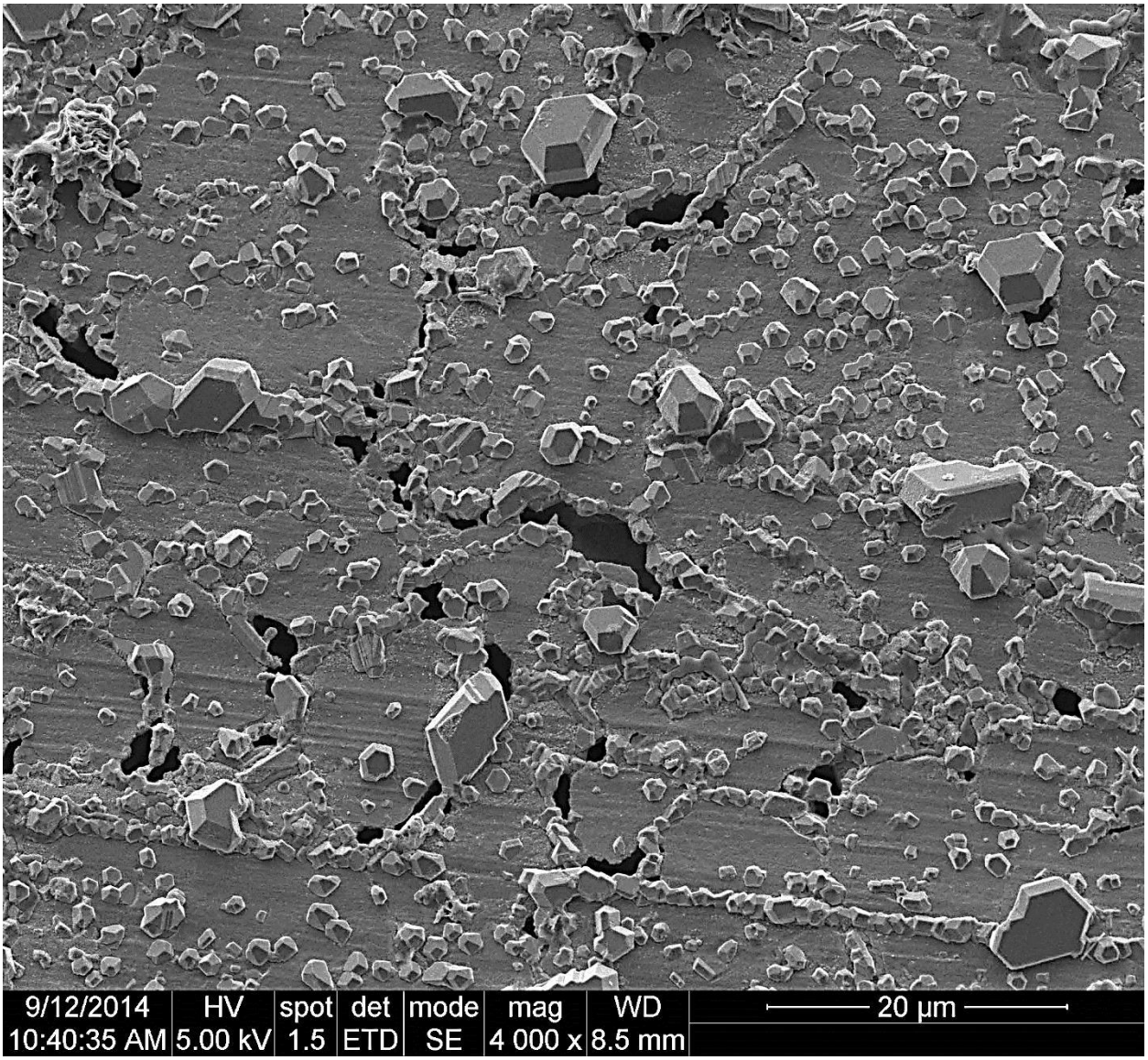
A.17-15: SEM image of illite on chalcocite from EBS 17



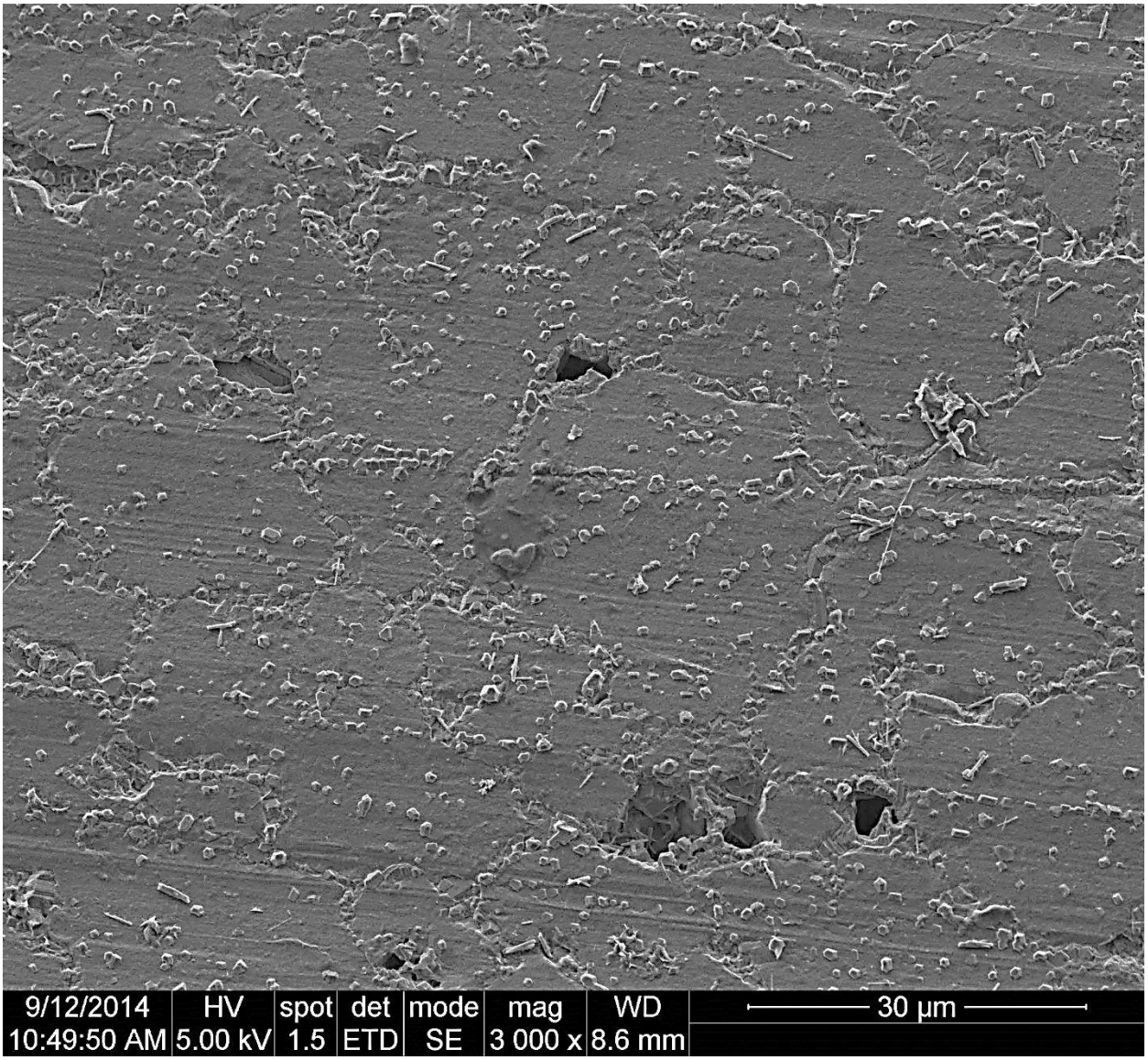
A.17-16: SEM image of poorly crystalline chalcocite mat



A.17-17: close up SEM image of sample from EBS 17



A.17-18: SEM image of individual chalcocite on copper from EBS 17



A.17-19: SEM image of low magnification of copper from EBS 17

APPENDIX B:

Electron Microprobe Mineral Chemistry

Biotite

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Biotite															
MR-Bentonite															
MRBENT-Bt1-1	36.26	4.38	13.06	0.00	25.87	0.25	7.44	0.00	0.07	0.03	0.41	8.47	0.53	0.22	97.00
MRBENT-Bt1-2	36.40	4.38	12.91	0.02	25.41	0.24	7.48	0.00	0.07	0.04	0.44	8.26	0.82	0.22	96.70
MRBENT-Bt1-3	36.29	4.48	12.87	0.00	25.65	0.25	7.70	0.00	0.04	0.02	0.40	8.46	0.39	0.23	96.80
Ave.	**36.32**	**4.41**	**12.95**	**0.01**	**25.65**	**0.25**	**7.54**	**0.00**	**0.06**	**0.03**	**0.42**	**8.40**	**0.58**	**0.22**	**96.83**
Std Dev	**0.06**	**0.05**	**0.08**	**0.01**	**0.19**	**0.00**	**0.11**	**0.00**	**0.01**	**0.01**	**0.02**	**0.10**	**0.18**	**0.01**	**0.13**
10 Oxygen + 2(OH,F,CL) Basis															
MRBENT-Bt1-1	3.11	0.28	1.32	0.00	1.85	0.02	0.95	0.00	0.00	0.00	0.07	0.93	0.14	0.03	8.54
MRBENT-Bt1-2	3.14	0.28	1.31	0.00	1.83	0.02	0.96	0.00	0.00	0.00	0.07	0.91	0.22	0.03	8.54
MRBENT-Bt1-3	3.11	0.29	1.30	0.00	1.84	0.02	0.98	0.00	0.00	0.00	0.07	0.92	0.10	0.03	8.52
Ave.	**3.12**	**0.28**	**1.31**	**0.00**	**1.84**	**0.02**	**0.97**	**0.00**	**0.00**	**0.00**	**0.07**	**0.92**	**0.16**	**0.03**	**8.53**
Std Dev	**0.02**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.05**	**0.00**	**0.01**
EBS-1															
EBS1-F1-Bt1-1	35.25	4.15	13.81	0.00	26.62	0.33	6.89	0.01	0.05	0.00	0.37	8.64	0.54	0.28	96.96
EBS1-F1-Bt1-2	35.08	4.26	13.95	0.00	26.63	0.33	6.86	0.01	0.06	0.01	0.32	8.59	0.41	0.30	96.83
EBS1-F1-Bt1-3	35.31	4.37	13.83	0.00	26.42	0.29	7.04	0.00	0.05	0.00	0.29	8.73	0.59	0.31	97.23
Ave.	**35.21**	**4.26**	**13.87**	**0.00**	**26.56**	**0.32**	**6.93**	**0.01**	**0.05**	**0.00**	**0.33**	**8.66**	**0.51**	**0.30**	**97.00**
Std Dev	**0.09**	**0.09**	**0.06**	**0.00**	**0.10**	**0.02**	**0.08**	**0.00**	**0.01**	**0.00**	**0.03**	**0.06**	**0.08**	**0.01**	**0.17**
10 Oxygen + 2(OH,F,CL) Basis															
EBS1-F1-Bt1-1	3.05	0.27	1.41	0.00	1.92	0.02	0.89	0.00	0.00	0.00	0.06	0.95	0.15	0.04	8.58
EBS1-F1-Bt1-2	3.03	0.28	1.42	0.00	1.92	0.02	0.88	0.00	0.00	0.00	0.05	0.95	0.11	0.04	8.56
EBS1-F1-Bt1-3	3.04	0.28	1.41	0.00	1.91	0.02	0.91	0.00	0.00	0.00	0.05	0.96	0.16	0.05	8.58
Ave.	**3.04**	**0.28**	**1.41**	**0.00**	**1.92**	**0.02**	**0.89**	**0.00**	**0.00**	**0.00**	**0.05**	**0.95**	**0.14**	**0.04**	**8.57**
Std Dev	**0.01**	**0.01**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.02**	**0.00**	**0.01**
EBS-2															
EBS2-F3-Bt1-1	36.30	4.68	13.17	0.00	25.32	0.30	7.81	0.03	0.08	0.03	0.41	7.95	0.55	0.21	96.83
EBS2-F3-Bt1-2	35.75	4.91	13.27	0.00	24.98	0.26	7.91	0.00	0.07	0.04	0.47	7.73	0.75	0.18	96.32
Ave.	**36.02**	**4.79**	**13.22**	**0.00**	**25.15**	**0.28**	**7.86**	**0.01**	**0.08**	**0.04**	**0.44**	**7.84**	**0.65**	**0.20**	**96.58**
Std Dev	**0.28**	**0.11**	**0.05**	**0.00**	**0.17**	**0.02**	**0.05**	**0.01**	**0.01**	**0.00**	**0.03**	**0.11**	**0.10**	**0.01**	**0.26**
10 Oxygen + 2(OH,F,CL) Basis															
EBS2-F3-Bt1-1	3.10	0.30	1.33	0.00	1.81	0.02	0.99	0.00	0.01	0.00	0.07	0.87	0.15	0.03	8.49
EBS2-F3-Bt1-2	3.08	0.32	1.35	0.00	1.80	0.02	1.01	0.00	0.00	0.00	0.08	0.85	0.21	0.03	8.51
Ave.	**3.09**	**0.31**	**1.34**	**0.00**	**1.80**	**0.02**	**1.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.86**	**0.18**	**0.03**	**8.50**
Std Dev	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.00**	**0.01**
EBS-4															

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS4-Bt1-1	35.21	5.25	12.93	0.00	28.20	0.21	6.41	0.02	0.09	0.00	0.45	8.48	0.63	0.30	97.84
EBS4-Bt1-2	34.88	5.15	12.91	0.00	28.21	0.20	6.42	0.01	0.08	0.03	0.55	8.39	0.71	0.26	97.46
Ave.	**35.05**	**5.20**	**12.92**	**0.00**	**28.21**	**0.20**	**6.41**	**0.02**	**0.08**	**0.02**	**0.50**	**8.44**	**0.67**	**0.28**	**97.65**
Std Dev	**0.16**	**0.05**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**	**0.05**	**0.05**	**0.04**	**0.02**	**0.19**
10 Oxygen + 2(OH,F,CL) Basis															
EBS4-Bt1-1	2.78	0.31	1.20	0.00	1.86	0.01	0.75	0.00	0.01	0.00	0.07	0.86	0.16	0.04	7.86
EBS4-Bt1-2	2.77	0.31	1.21	0.00	1.88	0.01	0.76	0.00	0.00	0.00	0.09	0.85	0.18	0.03	7.89
Ave.	**2.78**	**0.31**	**1.21**	**0.00**	**1.87**	**0.01**	**0.76**	**0.00**	**0.00**	**0.00**	**0.08**	**0.85**	**0.17**	**0.04**	**7.88**
Std Dev	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**
EBS-5															
EBS5-F1-Bt1-1	35.75	5.19	12.42	0.01	28.54	0.22	5.08	0.01	0.06	0.00	0.38	8.55	0.55	0.30	97.05
EBS5-F1-Bt1-2	35.00	5.07	12.44	0.00	28.50	0.22	5.08	0.00	0.03	0.03	0.35	8.47	0.53	0.31	96.03
EBS5-F1-Bt1-3	35.52	5.22	12.57	0.00	28.70	0.22	5.16	0.00	0.06	0.00	0.41	8.49	0.60	0.30	97.25
EBS5-F2-Bt-1	34.74	5.19	12.92	0.00	27.06	0.22	6.21	0.01	0.05	0.01	0.32	8.48	0.55	0.28	96.03
EBS5-F2-Bt-2	35.33	5.06	12.99	0.00	27.17	0.23	6.25	0.01	0.08	0.03	0.37	8.54	0.51	0.28	96.85
Ave.	**35.27**	**5.15**	**12.67**	**0.00**	**27.99**	**0.22**	**5.55**	**0.01**	**0.06**	**0.01**	**0.37**	**8.50**	**0.55**	**0.30**	**96.64**
Std Dev	**0.36**	**0.07**	**0.24**	**0.00**	**0.72**	**0.00**	**0.55**	**0.00**	**0.02**	**0.01**	**0.03**	**0.03**	**0.03**	**0.01**	**0.52**
10 Oxygen + 2(OH,F,CL) Basis															
EBS5-F1-Bt1-1	3.12	0.34	1.28	0.00	2.08	0.02	0.66	0.00	0.00	0.00	0.06	0.95	0.15	0.05	8.51
EBS5-F1-Bt1-2	3.09	0.34	1.29	0.00	2.10	0.02	0.67	0.00	0.00	0.00	0.06	0.95	0.15	0.05	8.53
EBS5-F1-Bt1-3	3.10	0.34	1.29	0.00	2.09	0.02	0.67	0.00	0.00	0.00	0.07	0.94	0.17	0.04	8.53
EBS5-F2-Bt-1	3.05	0.34	1.34	0.00	1.98	0.02	0.81	0.00	0.00	0.00	0.05	0.95	0.15	0.04	8.54
EBS5-F2-Bt-2	3.06	0.33	1.33	0.00	1.97	0.02	0.81	0.00	0.01	0.00	0.06	0.94	0.14	0.04	8.54
Ave.	**3.08**	**0.34**	**1.31**	**0.00**	**2.05**	**0.02**	**0.72**	**0.00**	**0.00**	**0.00**	**0.06**	**0.95**	**0.15**	**0.04**	**8.53**
Std Dev	**0.02**	**0.00**	**0.02**	**0.00**	**0.06**	**0.00**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**
EBS-6															
EBS6-F1-Bt1	35.69	5.35	13.27	0.01	27.21	0.21	6.27	0.02	0.10	0.01	0.47	8.35	0.69	0.26	97.89
EBS6-F1-Bt1-2	35.37	5.35	13.43	0.00	27.02	0.20	6.38	0.00	0.02	0.02	0.45	8.06	0.72	0.30	97.32
EBS6-F2-Bt2-1	35.07	5.45	13.21	0.00	27.35	0.20	6.23	0.00	0.07	0.02	0.36	8.42	0.75	0.25	97.38
EBS6-F2-Bt2-2	35.32	5.47	12.98	0.00	27.05	0.21	6.03	0.00	0.03	0.03	0.35	8.32	0.59	0.25	96.65
Ave.	**35.36**	**5.41**	**13.22**	**0.00**	**27.16**	**0.20**	**6.23**	**0.01**	**0.06**	**0.02**	**0.41**	**8.29**	**0.69**	**0.27**	**97.31**
Std Dev	**0.22**	**0.06**	**0.16**	**0.00**	**0.13**	**0.01**	**0.13**	**0.01**	**0.03**	**0.01**	**0.05**	**0.13**	**0.06**	**0.02**	**0.44**
10 Oxygen + 2(OH,F,CL) Basis															
EBS6-F1-Bt1	3.07	0.35	1.34	0.00	1.95	0.02	0.80	0.00	0.01	0.00	0.08	0.91	0.19	0.04	8.53
EBS6-F1-Bt1-2	3.05	0.35	1.37	0.00	1.95	0.01	0.82	0.00	0.00	0.00	0.07	0.89	0.20	0.04	8.52
EBS6-F2-Bt2-1	3.04	0.36	1.35	0.00	1.98	0.01	0.81	0.00	0.00	0.00	0.06	0.93	0.20	0.04	8.55
EBS6-F2-Bt2-2	3.07	0.36	1.33	0.00	1.97	0.02	0.78	0.00	0.00	0.00	0.06	0.92	0.16	0.04	8.50
Ave.	**3.06**	**0.35**	**1.35**	**0.00**	**1.96**	**0.01**	**0.80**	**0.00**	**0.00**	**0.00**	**0.07**	**0.91**	**0.19**	**0.04**	**8.52**

Std Dev	**0.01**	**0.01**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.02**	**0.00**	**0.02**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS-7															
EBS7-Bt1-1	35.36	5.10	13.26	0.00	27.84	0.19	6.38	0.02	0.02	0.03	0.57	8.40	0.82	0.27	97.85
EBS7-Bt1-2	36.03	4.89	13.21	0.01	27.31	0.20	6.24	0.00	0.06	0.02	0.65	8.16	0.82	0.27	97.47
Ave.	**35.69**	**4.99**	**13.23**	**0.00**	**27.58**	**0.20**	**6.31**	**0.01**	**0.04**	**0.03**	**0.61**	**8.28**	**0.82**	**0.27**	**97.66**
Std Dev	**0.33**	**0.10**	**0.02**	**0.00**	**0.26**	**0.00**	**0.07**	**0.01**	**0.02**	**0.00**	**0.04**	**0.12**	**0.00**	**0.00**	**0.19**
10 Oxygen + 2(OH,F,CL) Basis															
EBS7-Bt1-1	2.79	0.30	1.23	0.00	1.84	0.01	0.75	0.00	0.00	0.00	0.09	0.85	0.20	0.04	7.87
EBS7-Bt1-2	2.84	0.29	1.23	0.00	1.80	0.01	0.73	0.00	0.00	0.00	0.10	0.82	0.21	0.04	7.83
Ave.	**2.82**	**0.30**	**1.23**	**0.00**	**1.82**	**0.01**	**0.74**	**0.00**	**0.00**	**0.00**	**0.09**	**0.83**	**0.21**	**0.04**	**7.85**
Std Dev	**0.02**	**0.01**	**0.00**	**0.00**	**0.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.02**
EBS-9															
EBS9-Bt1-1	38.58	3.92	14.64	0.00	22.65	0.19	7.50	0.00	0.04	0.07	0.59	7.12	0.49	0.23	95.77
EBS9-Bt1-2	37.07	4.22	13.78	0.01	23.81	0.22	7.44	0.01	0.10	0.13	0.38	7.54	0.45	0.23	95.15
Ave.	**37.82**	**4.07**	**14.21**	**0.00**	**23.23**	**0.21**	**7.47**	**0.00**	**0.07**	**0.10**	**0.49**	**7.33**	**0.47**	**0.23**	**95.46**
Std Dev	**0.75**	**0.15**	**0.43**	**0.00**	**0.58**	**0.02**	**0.03**	**0.00**	**0.03**	**0.03**	**0.10**	**0.21**	**0.02**	**0.00**	**0.31**
10 Oxygen + 2(OH,F,CL) Basis															
EBS9-Bt1-1	2.96	0.23	1.32	0.00	1.45	0.01	0.86	0.00	0.00	0.01	0.09	0.70	0.12	0.03	7.62
EBS9-Bt1-2	2.90	0.25	1.27	0.00	1.56	0.01	0.87	0.00	0.01	0.01	0.06	0.75	0.11	0.03	7.69
Ave.	**2.93**	**0.24**	**1.30**	**0.00**	**1.51**	**0.01**	**0.86**	**0.00**	**0.00**	**0.01**	**0.07**	**0.72**	**0.12**	**0.03**	**7.66**
Std Dev	**0.03**	**0.01**	**0.03**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.00**	**0.00**	**0.03**
EBS-10															
EBS10-Bt-1	34.81	5.20	12.85	0.00	28.07	0.20	6.46	0.00	0.07	0.03	0.57	8.47	0.68	0.26	97.33
EBS10-Bt-2	34.99	5.06	12.97	0.00	28.08	0.21	6.51	0.00	0.05	0.03	0.61	8.43	0.60	0.27	97.49
EBS10-Bt2-1	35.60	5.03	12.92	0.00	27.56	0.21	6.48	0.01	0.07	0.01	0.48	8.47	0.61	0.25	97.38
EBS10-Bt2-2	34.69	4.93	12.82	0.01	27.01	0.18	6.43	0.00	0.07	0.04	0.57	8.08	0.60	0.25	95.36
Ave.	**35.02**	**5.05**	**12.89**	**0.00**	**27.68**	**0.20**	**6.47**	**0.00**	**0.06**	**0.03**	**0.56**	**8.36**	**0.62**	**0.26**	**96.89**
Std Dev	**0.35**	**0.10**	**0.06**	**0.01**	**0.44**	**0.01**	**0.03**	**0.01**	**0.01**	**0.01**	**0.05**	**0.16**	**0.03**	**0.01**	**0.89**
10 Oxygen + 2(OH,F,CL) Basis															
EBS10-Bt-1	2.77	0.31	1.21	0.00	1.87	0.01	0.77	0.00	0.00	0.00	0.09	0.86	0.17	0.03	7.89
EBS10-Bt-2	2.77	0.30	1.21	0.00	1.86	0.01	0.77	0.00	0.00	0.00	0.09	0.85	0.15	0.04	7.89
EBS10-Bt2-1	2.81	0.30	1.20	0.00	1.82	0.01	0.76	0.00	0.00	0.00	0.07	0.85	0.15	0.03	7.84
EBS10-Bt2-2	2.80	0.30	1.22	0.00	1.82	0.01	0.77	0.00	0.00	0.00	0.09	0.83	0.15	0.03	7.85
Ave.	**2.79**	**0.30**	**1.21**	**0.00**	**1.84**	**0.01**	**0.77**	**0.00**	**0.00**	**0.00**	**0.09**	**0.85**	**0.16**	**0.03**	**7.87**
Std Dev	**0.02**	**0.01**	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.00**	**0.02**
EBS-11															

EBS11-Bt-1	36.65	4.17	13.43	0.00	25.16	0.22	7.36	0.01	0.10	0.04	0.49	8.17	0.70	0.23	96.38
EBS11-Bt-2	36.52	4.24	13.52	0.00	25.63	0.26	7.40	0.01	0.05	0.03	0.56	8.25	0.60	0.24	97.01

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Average	36.59	4.20	13.47	0.00	25.39	0.24	7.38	0.01	0.07	0.04	0.52	8.21	0.65	0.23	96.70
Std Dev	0.06	0.03	0.05	0.00	0.23	0.02	0.02	0.00	0.02	0.00	0.04	0.04	0.05	0.01	0.32
10 Oxygen + 2(OH,F,CL) Basis															
EBS11-Bt-1	3.96	0.01	1.65	0.00	2.70	0.01	0.52	0.00	0.00	0.13	0.46	0.02	0.00	0.00	9.45
EBS11-Bt-2	3.99	0.00	1.60	0.00	2.71	0.01	0.54	0.00	0.00	0.12	0.47	0.02	0.00	0.02	9.46
Average	3.97	0.00	1.62	0.00	2.71	0.01	0.53	0.00	0.00	0.13	0.46	0.02	0.00	0.01	9.46
Std Dev	0.02	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
EBS-12															
EBS12-Bt1-1	35.65	4.44	12.72	0.01	25.85	0.29	7.99	0.00	0.06	0.04	0.39	8.57	0.71	0.22	96.58
EBS12-Bt1-2	35.56	4.38	13.12	0.00	25.35	0.28	8.14	0.00	0.07	0.06	0.38	8.29	0.74	0.24	96.24
Average	35.61	4.41	12.92	0.01	25.60	0.28	8.06	0.00	0.07	0.05	0.38	8.43	0.72	0.23	96.41
Std Dev	0.04	0.03	0.20	0.01	0.25	0.01	0.07	0.00	0.00	0.01	0.01	0.14	0.02	0.01	0.17
10 Oxygen + 2(OH,F,CL) Basis															
EBS12-Bt1-1	2.82	0.26	1.19	0.00	1.71	0.02	0.94	0.00	0.00	0.00	0.06	0.87	0.18	0.02	7.88
EBS12-Bt1-2	2.82	0.26	1.23	0.00	1.68	0.02	0.96	0.00	0.00	0.00	0.06	0.84	0.19	0.02	7.87
Average	2.82	0.26	1.21	0.00	1.70	0.02	0.95	0.00	0.00	0.00	0.06	0.85	0.18	0.02	7.87
Std Dev	0.00	0.00	0.02	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01
EBS-13															
EB13-Bt-1	35.02	4.09	13.61	0.01	26.29	0.33	7.56	0.00	0.08	0.04	0.30	8.58	0.72	0.22	96.50
EB13-Bt-2	35.41	5.02	13.34	0.00	27.78	0.21	6.24	0.03	0.08	0.00	0.45	8.57	0.77	0.30	97.81
EB13-Bt-3	35.44	4.87	13.49	0.00	27.81	0.20	6.31	0.02	0.09	0.00	0.43	8.61	0.70	0.29	97.90
Average	**35.29**	**4.66**	**13.48**	**0.00**	**27.29**	**0.25**	**6.70**	**0.01**	**0.08**	**0.02**	**0.39**	**8.59**	**0.73**	**0.27**	**97.41**
Std Dev	**0.24**	**0.50**	**0.14**	**0.00**	**0.87**	**0.07**	**0.74**	**0.01**	**0.00**	**0.02**	**0.08**	**0.02**	**0.04**	**0.04**	**0.78**
10 Oxygen + 2(OH,F,CL) Basis															
EB13-Bt-1	2.78	0.24	1.28	0.00	1.75	0.02	0.90	0.00	0.00	0.00	0.05	0.87	0.18	0.03	7.90
EB13-Bt-2	2.80	0.30	1.24	0.00	1.84	0.01	0.74	0.00	0.00	0.00	0.07	0.86	0.19	0.04	7.86
EB13-Bt-3	2.79	0.29	1.25	0.00	1.83	0.01	0.74	0.00	0.01	0.00	0.06	0.87	0.18	0.04	7.86
Average	**2.79**	**0.28**	**1.26**	**0.00**	**1.81**	**0.02**	**0.79**	**0.00**	**0.00**	**0.00**	**0.06**	**0.87**	**0.18**	**0.04**	**7.87**
Std Dev	**0.01**	**0.03**	**0.02**	**0.00**	**0.05**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.01**	**0.02**
EBS-15															
EB15-Bt-1	34.71	4.08	13.27	0.02	25.60	0.27	7.40	0.00	0.02	0.02	0.29	8.53	0.44	0.23	94.66
EB15-Bt-2	35.06	4.13	13.56	0.01	25.48	0.28	7.51	0.00	0.08	0.02	0.32	8.56	0.31	0.24	95.39
EB15-Bt-3	35.07	3.70	13.48	0.00	26.87	0.41	6.88	0.02	0.10	0.04	0.29	8.54	0.82	0.29	96.08
Average	**34.94**	**3.97**	**13.44**	**0.01**	**25.99**	**0.32**	**7.26**	**0.01**	**0.07**	**0.03**	**0.30**	**8.54**	**0.53**	**0.25**	**95.38**
Std Dev	**0.21**	**0.24**	**0.15**	**0.01**	**0.77**	**0.08**	**0.34**	**0.01**	**0.04**	**0.01**	**0.02**	**0.01**	**0.27**	**0.03**	**0.71**

10 Oxygen + 2(OH,F,CL) Basis															
EB15-Bt-1	2.80	0.25	1.26	0.00	1.72	0.02	0.89	0.00	0.00	0.00	0.05	0.88	0.11	0.03	7.86

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EB15-Bt-2	2.79	0.25	1.27	0.00	1.70	0.02	0.89	0.00	0.00	0.00	0.05	0.87	0.08	0.03	7.84
EB15-Bt-3	2.82	0.22	1.28	0.00	1.81	0.03	0.82	0.00	0.01	0.00	0.04	0.88	0.21	0.04	7.90
Average	**2.80**	**0.24**	**1.27**	**0.00**	**1.74**	**0.02**	**0.87**	**0.00**	**0.00**	**0.00**	**0.05**	**0.87**	**0.13**	**0.03**	**7.87**
Std Dev	**0.01**	**0.01**	**0.01**	**0.00**	**0.06**	**0.01**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.00**	**0.03**
EB-16															
EB16-Bt-1	35.43	3.99	13.47	0.02	25.67	0.28	7.73	0.02	0.10	0.04	0.30	8.77	0.49	0.23	96.29
EB16-Bt-2	34.25	4.45	13.96	0.00	25.11	0.27	7.78	0.02	0.05	0.00	0.24	8.46	0.58	0.24	95.11
Average	**34.84**	**4.22**	**13.72**	**0.01**	**25.39**	**0.27**	**7.76**	**0.02**	**0.08**	**0.02**	**0.27**	**8.61**	**0.53**	**0.24**	**95.70**
Std Dev	**0.83**	**0.32**	**0.35**	**0.01**	**0.40**	**0.01**	**0.03**	**0.00**	**0.03**	**0.03**	**0.05**	**0.22**	**0.06**	**0.01**	**0.83**
10 Oxygen + 2(OH,F,CL) Basis															
EB16-Bt-1	2.80	0.24	1.26	0.00	1.70	0.02	0.91	0.00	0.01	0.00	0.05	0.89	0.12	0.03	7.87
EB16-Bt-2	2.74	0.27	1.32	0.00	1.68	0.02	0.93	0.00	0.00	0.00	0.04	0.86	0.15	0.03	7.87
Average	**2.77**	**0.25**	**1.29**	**0.00**	**1.69**	**0.02**	**0.92**	**0.00**	**0.00**	**0.00**	**0.04**	**0.87**	**0.13**	**0.03**	**7.87**
Std Dev	**0.04**	**0.02**	**0.04**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.02**	**0.00**	**0.00**
EB-17															
EB17-Bt-1	34.46	4.62	13.30	0.01	26.89	0.24	7.23	0.00	0.08	0.03	0.31	8.51	0.78	0.22	96.30
EB17-Bt-2	34.87	4.88	13.05	0.00	27.36	0.21	6.20	0.00	0.05	0.03	0.33	8.49	0.57	0.30	96.03
Average	**34.66**	**4.75**	**13.17**	**0.01**	**27.12**	**0.23**	**6.72**	**0.00**	**0.07**	**0.03**	**0.32**	**8.50**	**0.67**	**0.26**	**96.17**
Std Dev	**0.29**	**0.18**	**0.17**	**0.01**	**0.33**	**0.02**	**0.72**	**0.00**	**0.02**	**0.00**	**0.02**	**0.01**	**0.15**	**0.05**	**0.19**
10 Oxygen + 2(OH,F,CL) Basis															
EB17-Bt-1	2.76	0.28	1.26	0.00	1.80	0.02	0.86	0.00	0.00	0.00	0.05	0.87	0.20	0.02	7.90
EB17-Bt-2	2.80	0.29	1.23	0.00	1.84	0.01	0.74	0.00	0.00	0.00	0.05	0.87	0.14	0.02	7.84
Average	**2.78**	**0.29**	**1.25**	**0.00**	**1.82**	**0.02**	**0.80**	**0.00**	**0.00**	**0.00**	**0.05**	**0.87**	**0.17**	**0.02**	**7.87**
Std Dev	**0.03**	**0.01**	**0.02**	**0.00**	**0.02**	**0.00**	**0.09**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.04**

APPENDIX B:

Electron Microprobe Mineral Chemistry

Chlorite/Saponite

Stipnomelane

CHLORITE / SAPONITE

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Chlorites (03/12/13)															
EBS-2															
EBS2 Chl-2	32.53	0.08	13.68	2.74	27.98	0.30	2.16	2.16	0.04	1.90	1.46	0.79	0.28	0.41	86.51
EBS2 Chl-4	30.66	0.00	12.22	0.48	35.91	0.37	2.19	0.86	0.03	1.24	1.47	0.67	0.09	0.95	87.16
EBS2 Chl-7	29.58	0.01	11.64	3.48	34.91	0.68	1.57	2.60	0.01	0.03	1.26	0.07	0.12	0.37	86.34
EBS2 Chl-8	37.59	0.01	12.03	0.28	29.34	0.29	2.39	0.33	0.03	1.66	1.93	0.63	0.00	0.36	86.88
EBS2 Chl-10	37.07	0.03	13.87	0.44	29.33	0.31	1.75	0.49	0.00	1.67	1.72	0.91	0.12	0.20	87.90
EBS2 Chl-11	36.35	0.00	13.51	0.68	28.16	0.35	1.65	1.60	0.05	1.40	1.88	0.57	0.18	0.16	86.54
Average EBS-2	33.96	0.02	12.83	1.35	30.94	0.38	1.95	1.34	0.03	1.32	1.62	0.61	0.13	0.41	86.89
Std Dev	**3.48**	**0.03**	**0.97**	**1.39**	**3.53**	**0.15**	**0.34**	**0.93**	**0.02**	**0.67**	**0.27**	**0.29**	**0.09**	**0.29**	**0.58**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS2 Chl-2	3.66	0.01	1.81	0.24	2.63	0.03	0.36	0.20	0.00	0.23	0.32	0.11	0.10	0.08	9.61
EBS2 Chl-4	3.58	0.00	1.68	0.04	3.50	0.04	0.38	0.08	0.00	0.16	0.33	0.10	0.03	0.19	9.89
EBS2 Chl-7	3.48	0.00	1.62	0.32	3.44	0.07	0.28	0.25	0.00	0.00	0.29	0.01	0.05	0.07	9.75
EBS2 Chl-8	4.07	0.00	1.54	0.02	2.66	0.03	0.39	0.03	0.00	0.19	0.40	0.09	0.00	0.07	9.42
EBS2 Chl-10	3.97	0.00	1.75	0.04	2.63	0.03	0.28	0.04	0.00	0.19	0.36	0.12	0.04	0.04	9.41
EBS2 Chl-11	3.97	0.00	1.74	0.06	2.57	0.03	0.27	0.14	0.00	0.16	0.40	0.08	0.06	0.03	9.42
Average EBS-2	**3.79**	**0.00**	**1.69**	**0.12**	**2.90**	**0.04**	**0.33**	**0.12**	**0.00**	**0.16**	**0.35**	**0.09**	**0.05**	**0.08**	**9.58**
Std Dev	**0.22**	**0.00**	**0.09**	**0.12**	**0.40**	**0.01**	**0.05**	**0.08**	**0.00**	**0.07**	**0.04**	**0.04**	**0.03**	**0.05**	**0.19**
Chl 18 Oxygen	4.87	0.00	2.17	0.16	3.74	0.05	0.42	0.16	0.00	0.20	0.45	0.11	0.06	0.10	12.32
EBS-5															
Good Points: Low-Iron Phase															
EBS5-Sil-1	53.24	0.12	16.53	0.09	5.64	0.04	2.00	0.14	0.01	1.11	0.34	0.59	0.13	0.04	80.02
EBS5-Sil-2	52.91	0.13	17.43	0.07	3.66	0.04	1.62	0.15	0.00	0.77	0.29	0.59	0.27	0.04	77.95
EBS5-Sil-3	54.33	0.08	17.14	0.09	3.63	0.03	1.68	0.15	0.03	0.68	0.36	0.61	0.02	0.04	78.86
EBS5-Sil-4	57.69	0.13	16.16	0.13	4.12	0.01	1.62	0.06	0.01	0.62	0.63	0.63	0.18	0.05	82.04
EBS5-Sil-5	60.13	0.12	14.90	0.12	3.25	0.02	1.45	0.06	0.00	0.69	0.71	0.82	0.05	0.05	82.35
EBS5-Sil-7	58.44	0.11	13.70	0.13	3.67	0.05	1.49	0.14	0.00	0.65	0.56	0.68	0.26	0.04	79.92
EBS5-Sil-8	63.84	0.00	7.32	0.54	7.70	0.12	1.48	0.33	0.02	0.66	0.33	0.15	0.19	0.03	82.71

EBS5-Sil-12	52.70	0.08	14.94	0.09	5.38	0.06	2.19	0.10	0.00	0.96	0.40	0.33	0.24	0.10	77.56
EBS5-Sil-13	46.83	0.11	21.19	0.31	7.13	0.04	2.61	0.11	0.00	0.97	0.61	0.52	0.18	0.13	80.74
EBS5-Sil-14	62.14	0.08	14.63	0.38	5.85	0.03	2.11	0.12	0.00	0.84	0.63	0.40	0.25	0.14	87.60

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS5-Sil-15	46.05	0.09	20.53	0.35	9.61	0.07	3.21	0.16	0.00	1.60	0.73	0.29	0.14	0.26	83.07
EBS5-Sil-18	59.26	0.06	14.23	0.13	4.44	0.03	1.88	0.10	0.01	0.84	0.49	0.35	0.12	0.11	82.03
EBS5-Sil-19	62.40	0.06	12.58	0.16	3.19	0.02	1.39	0.10	0.03	0.71	0.42	0.42	0.08	0.08	81.66
EBS5-Sil-20	58.20	0.08	15.70	0.13	4.21	0.02	1.87	0.07	0.03	0.81	0.49	0.35	0.13	0.07	82.17
EBS5-Sil-22	63.02	0.05	14.42	0.20	4.75	0.04	1.35	0.11	0.00	0.64	0.76	1.21	0.12	0.03	86.71
EBS5-Sil-26	57.53	0.08	19.43	0.24	5.29	0.02	1.92	0.16	0.00	0.97	0.51	0.44	0.24	0.06	86.88
EBS5-Sil-30	65.94	0.05	10.02	0.07	2.34	0.00	1.21	0.05	0.00	0.54	0.53	0.33	0.19	0.11	81.37
EBS5-Sil-31	61.28	0.08	11.95	0.05	2.64	0.01	1.38	0.05	0.00	0.52	0.89	0.39	0.00	0.12	79.37
EBS5-Sil-32	62.01	0.08	10.80	0.07	2.37	0.03	1.27	0.04	0.01	0.54	0.39	0.36	0.25	0.10	78.31
EBS5-Sil-33	59.18	0.03	13.61	0.05	3.10	0.00	1.72	0.08	0.00	0.63	0.43	0.55	0.00	0.10	79.47
EBS5-Sil-34	62.16	0.04	11.12	0.08	2.44	0.00	1.32	0.07	0.01	0.53	0.41	0.46	0.12	0.09	78.85
EBS5-Sil-36	59.16	0.06	14.19	0.20	5.86	0.03	1.81	0.12	0.01	0.73	0.58	0.27	0.23	0.06	83.30
EBS5-Sil-38	56.78	0.11	12.81	0.13	5.36	0.04	1.56	0.10	0.00	0.74	0.58	0.31	0.08	0.09	78.68
Average	**58.05**	**0.08**	**14.58**	**0.17**	**4.59**	**0.03**	**1.75**	**0.11**	**0.01**	**0.77**	**0.52**	**0.48**	**0.15**	**0.08**	**81.38**
Std Dev	**5.10**	**0.03**	**3.31**	**0.12**	**1.84**	**0.03**	**0.47**	**0.06**	**0.01**	**0.24**	**0.15**	**0.22**	**0.09**	**0.05**	**2.83**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS5-Sil-1	4.02	0.01	1.47	0.01	0.36	0.00	0.23	0.01	0.00	0.09	0.05	0.06	0.03	0.00	6.30
EBS5-Sil-2	4.05	0.01	1.57	0.00	0.23	0.00	0.18	0.01	0.00	0.06	0.04	0.06	0.06	0.01	6.23
EBS5-Sil-3	4.08	0.00	1.52	0.01	0.23	0.00	0.19	0.01	0.00	0.06	0.05	0.06	0.00	0.01	6.21
EBS5-Sil-4	4.19	0.01	1.38	0.01	0.25	0.00	0.18	0.00	0.00	0.05	0.09	0.06	0.04	0.01	6.21
EBS5-Sil-5	4.30	0.01	1.26	0.01	0.19	0.00	0.15	0.00	0.00	0.05	0.10	0.07	0.01	0.01	6.15
EBS5-Sil-7	4.34	0.01	1.20	0.01	0.23	0.00	0.17	0.01	0.00	0.05	0.08	0.06	0.06	0.00	6.16
EBS5-Sil-8	4.65	0.00	0.63	0.03	0.47	0.01	0.16	0.02	0.00	0.05	0.05	0.01	0.04	0.00	6.08
EBS5-Sil-12	4.11	0.00	1.37	0.01	0.35	0.00	0.25	0.01	0.00	0.08	0.06	0.03	0.06	0.01	6.28
EBS5-Sil-13	3.60	0.01	1.92	0.02	0.46	0.00	0.30	0.01	0.00	0.08	0.09	0.05	0.04	0.02	6.53
EBS5-Sil-14	4.27	0.00	1.18	0.02	0.34	0.00	0.22	0.01	0.00	0.06	0.08	0.03	0.05	0.02	6.22
EBS5-Sil-15	3.52	0.01	1.85	0.02	0.61	0.00	0.36	0.01	0.00	0.13	0.11	0.03	0.03	0.03	6.65
EBS5-Sil-18	4.29	0.00	1.21	0.01	0.27	0.00	0.20	0.01	0.00	0.06	0.07	0.03	0.03	0.01	6.16
EBS5-Sil-19	4.47	0.00	1.06	0.01	0.19	0.00	0.15	0.01	0.00	0.05	0.06	0.04	0.02	0.01	6.05
EBS5-Sil-20	4.21	0.00	1.34	0.01	0.25	0.00	0.20	0.00	0.00	0.06	0.07	0.03	0.03	0.01	6.19

EBS5-Sil-22	4.33	0.00	1.17	0.01	0.27	0.00	0.14	0.01	0.00	0.05	0.10	0.11	0.03	0.00	6.19
EBS5-Sil-26	3.99	0.00	1.59	0.01	0.31	0.00	0.20	0.01	0.00	0.07	0.07	0.04	0.05	0.01	6.29
EBS5-Sil-30	4.70	0.00	0.84	0.00	0.14	0.00	0.13	0.00	0.00	0.04	0.07	0.03	0.04	0.01	5.96
EBS5-Sil-31	4.50	0.00	1.03	0.00	0.16	0.00	0.15	0.00	0.00	0.04	0.13	0.04	0.00	0.02	6.06
EBS5-Sil-32	4.61	0.00	0.95	0.00	0.15	0.00	0.14	0.00	0.00	0.04	0.06	0.03	0.06	0.01	5.99

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS5-Sil-33	4.37	0.00	1.18	0.00	0.19	0.00	0.19	0.00	0.00	0.05	0.06	0.05	0.00	0.01	6.10
EBS5-Sil-34	4.58	0.00	0.97	0.00	0.15	0.00	0.15	0.00	0.00	0.04	0.06	0.04	0.03	0.01	6.00
EBS5-Sil-36	4.27	0.00	1.21	0.01	0.35	0.00	0.19	0.01	0.00	0.06	0.08	0.02	0.05	0.01	6.21
EBS5-Sil-38	4.31	0.01	1.15	0.01	0.34	0.00	0.18	0.01	0.00	0.06	0.09	0.03	0.02	0.01	6.18
Average	**4.25**	**0.00**	**1.26**	**0.01**	**0.28**	**0.00**	**0.19**	**0.01**	**0.00**	**0.06**	**0.07**	**0.04**	**0.03**	**0.01**	**6.19**
Std Dev	**0.30**	**0.00**	**0.30**	**0.01**	**0.12**	**0.00**	**0.05**	**0.00**	**0.00**	**0.02**	**0.02**	**0.02**	**0.02**	**0.01**	**0.16**
EBS-6															
EBS6 Chl-4	36.90	0.00	11.97	0.02	33.99	0.22	0.81	0.01	0.00	0.53	1.12	0.43	0.05	0.09	86.13
EBS6 Chl-5	37.24	0.01	11.72	0.01	33.18	0.23	0.78	0.02	0.02	0.48	1.46	0.46	0.03	0.07	85.72
EBS6 Chl-6	35.18	0.01	12.26	0.03	33.11	0.22	0.84	0.00	0.02	0.50	1.53	0.34	0.00	0.01	84.04
EBS6 Chl-7	35.23	0.03	12.62	0.04	33.43	0.23	0.93	0.01	0.00	0.51	1.15	0.62	0.03	0.08	84.91
EBS6 Chl-9	35.83	0.00	13.42	0.00	33.26	0.20	0.83	0.00	0.00	0.84	0.64	0.15	0.00	0.01	85.18
EBS6 Chl-10	36.78	0.00	14.11	0.03	34.52	0.23	0.85	0.00	0.00	0.89	0.56	0.17	0.07	0.01	88.21
EBS6 Chl-11	35.67	0.00	13.31	0.00	35.10	0.21	0.81	0.01	0.00	0.85	0.72	0.17	0.00	0.02	86.87
EBS6 Chl-12	36.76	0.02	14.18	0.02	35.31	0.22	0.84	0.00	0.03	0.76	0.63	0.23	0.08	0.02	89.11
Average EBS-6	**36.20**	**0.01**	**12.95**	**0.02**	**33.99**	**0.22**	**0.83**	**0.01**	**0.01**	**0.67**	**0.98**	**0.32**	**0.03**	**0.04**	**86.27**
Std Dev	**0.81**	**0.01**	**0.95**	**0.01**	**0.89**	**0.01**	**0.04**	**0.01**	**0.01**	**0.18**	**0.39**	**0.17**	**0.03**	**0.03**	**1.71**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS6 Chl-4	4.08	0.00	1.56	0.00	3.14	0.02	0.13	0.00	0.00	0.06	0.24	0.06	0.02	0.02	9.31
EBS6 Chl-5	4.12	0.00	1.53	0.00	3.07	0.02	0.13	0.00	0.00	0.06	0.31	0.06	0.01	0.01	9.31
EBS6 Chl-6	3.99	0.00	1.64	0.00	3.14	0.02	0.14	0.00	0.00	0.06	0.34	0.05	0.00	0.00	9.38
EBS6 Chl-7	3.97	0.00	1.68	0.00	3.15	0.02	0.16	0.00	0.00	0.06	0.25	0.09	0.01	0.02	9.37
EBS6 Chl-9	3.97	0.00	1.75	0.00	3.09	0.02	0.14	0.00	0.00	0.10	0.14	0.02	0.00	0.00	9.23
EBS6 Chl-10	3.95	0.00	1.79	0.00	3.10	0.02	0.14	0.00	0.00	0.10	0.12	0.02	0.02	0.00	9.24
EBS6 Chl-11	3.92	0.00	1.73	0.00	3.23	0.02	0.13	0.00	0.00	0.10	0.15	0.02	0.00	0.00	9.31

EBS6 Chl-12	3.93	0.00	1.79	0.00	3.15	0.02	0.13	0.00	0.00	0.09	0.13	0.03	0.03	0.00	9.28
Average EBS-6	**3.99**	**0.00**	**1.68**	**0.00**	**3.13**	**0.02**	**0.14**	**0.00**	**0.00**	**0.08**	**0.21**	**0.05**	**0.01**	**0.01**	**9.30**
Std Dev	**0.07**	**0.00**	**0.10**	**0.00**	**0.05**	**0.00**	**0.01**	**0.00**	**0.00**	**0.02**	**0.09**	**0.02**	**0.01**	**0.01**	0.06
EBS-7															
EBS7-Chl1-1	34.88	0.05	15.55	0.00	33.78	0.12	1.62	0.01	0.05	0.08	0.82	0.02	0.00	0.06	87.02
EBS7-Chl1-2	34.32	0.07	15.08	0.02	33.58	0.11	1.64	0.00	0.00	0.07	0.50	0.01	0.00	0.11	85.48

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS7-Chl1-3	32.39	0.05	14.80	0.00	37.47	0.13	1.60	0.00	0.01	0.07	1.01	0.04	0.00	0.05	87.60
Average	**33.86**	**0.05**	**15.14**	**0.01**	**34.94**	**0.12**	**1.62**	**0.01**	**0.02**	**0.07**	**0.77**	**0.02**	**0.00**	**0.07**	**86.70**
Std Dev	**1.30**	**0.01**	**0.38**	**0.01**	**2.19**	**0.01**	**0.02**	**0.01**	**0.03**	**0.00**	**0.26**	**0.02**	**0.00**	**0.03**	**1.09**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS7-Chl1-1	3.79	0.00	1.99	0.00	3.07	0.01	0.26	0.00	0.00	0.01	0.17	0.00	0.00	0.01	9.31
EBS7-Chl1-2	3.80	0.01	1.97	0.00	3.11	0.01	0.27	0.00	0.00	0.01	0.11	0.00	0.00	0.02	9.28
EBS7-Chl1-3	3.60	0.00	1.94	0.00	3.48	0.01	0.27	0.00	0.00	0.01	0.22	0.01	0.00	0.01	9.54
Average	**3.73**	**0.00**	**1.97**	**0.00**	**3.22**	**0.01**	**0.27**	**0.00**	**0.00**	**0.01**	**0.17**	**0.00**	**0.00**	**0.01**	**9.38**
Std Dev	**0.11**	**0.00**	**0.02**	**0.00**	**0.23**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.00**	**0.00**	**0.01**	**0.14**
EBS-9															
EBS9-Chl1-1	35.06	0.05	14.06	0.00	32.78	0.08	1.73	0.00	0.00	0.55	3.14	0.09	0.00	0.01	87.56
EBS9-Chl2-1	37.02	0.06	15.10	0.00	33.26	0.13	1.78	0.00	0.01	0.64	1.50	0.13	0.00	0.00	89.62
EBS9-Chl2-2	36.83	0.02	15.08	0.00	33.31	0.10	1.84	0.00	0.06	0.69	0.98	0.08	0.04	0.00	89.01
Average	**36.30**	**0.04**	**14.75**	**0.00**	**33.11**	**0.10**	**1.78**	**0.00**	**0.02**	**0.63**	**1.87**	**0.10**	**0.01**	**0.01**	**88.73**
Std Dev	**1.08**	**0.02**	**0.59**	**0.00**	**0.29**	**0.02**	**0.05**	**0.00**	**0.03**	**0.07**	**1.12**	**0.03**	**0.02**	**0.00**	**1.06**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS9-Chl1-1	3.81	0.00	1.80	0.00	2.98	0.01	0.28	0.00	0.00	0.06	0.66	0.01	0.00	0.00	9.62
EBS9-Chl2-1	3.88	0.00	1.86	0.00	2.91	0.01	0.28	0.00	0.00	0.07	0.30	0.02	0.00	0.00	9.35
EBS9-Chl2-2	3.88	0.00	1.87	0.00	2.94	0.01	0.29	0.00	0.00	0.08	0.20	0.01	0.01	0.00	9.29
Average	**3.86**	**0.00**	**1.85**	**0.00**	**2.94**	**0.01**	**0.28**	**0.00**	**0.00**	**0.07**	**0.39**	**0.01**	**0.00**	**0.00**	**9.42**
Std Dev	**0.04**	**0.00**	**0.04**	**0.00**	**0.03**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**	**0.24**	**0.00**	**0.01**	**0.00**	**0.18**

EBS-10															
Good Points: High-Iron Phase															
EBS10-Sil-7	28.30	0.07	17.74	1.08	28.06	0.37	3.45	0.38	0.02	1.08	0.70	0.04	0.12	0.27	81.69
EBS10-Sil-8	22.52	0.08	18.01	1.20	26.78	0.35	3.18	1.42	0.00	0.84	0.47	0.06	0.11	0.22	75.24
EBS10-Sil-9	28.14	0.08	17.39	1.06	27.03	0.40	3.22	0.37	0.02	1.17	0.82	0.06	0.23	0.32	80.29
EBS10-Sil-10	28.50	0.07	17.73	0.98	27.89	0.38	3.18	1.25	0.00	1.17	0.85	0.05	0.08	0.25	82.40
EBS10-Sil-11	27.97	0.08	15.26	0.94	27.38	0.35	2.67	0.99	0.00	1.11	0.92	0.07	0.00	0.29	78.04
EBS10-Sil-12	27.07	0.06	17.20	1.24	28.48	0.41	3.09	0.66	0.01	1.01	0.69	0.04	0.15	0.19	80.31
EBS10-Sil-13	31.92	0.09	16.29	1.15	28.96	0.37	3.20	0.61	0.00	1.24	1.05	0.06	0.08	0.27	85.29

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS10-Sil-14	29.67	0.07	16.67	0.73	27.98	0.39	3.18	0.31	0.00	1.04	0.92	0.07	0.00	0.25	81.29
EBS10-Sil-15	26.88	0.07	16.79	1.06	28.35	0.37	3.15	0.66	0.00	0.83	0.85	0.06	0.00	0.17	79.23
EBS10-Sil-17	28.70	0.06	16.82	1.17	28.65	0.40	3.09	0.40	0.01	1.08	0.77	0.06	0.01	0.20	81.42
EBS10-Sil-18	28.75	0.09	16.84	0.92	28.76	0.40	3.20	2.80	0.02	1.34	0.72	0.06	0.10	0.28	84.28
EBS10-Sil-19	29.98	0.08	17.63	0.92	27.90	0.43	3.03	0.70	0.02	1.03	0.90	0.06	0.07	0.26	83.01
EBS10-Sil-20	29.53	0.08	16.24	0.73	28.06	0.43	2.82	0.58	0.00	1.21	0.88	0.08	0.15	0.28	81.07
EBS10-Sil-25	32.89	0.09	15.65	0.38	23.31	0.30	3.23	0.23	0.00	1.28	1.10	0.23	0.14	0.40	79.25
EBS10-Sil-26	38.06	0.08	15.69	0.22	22.63	0.34	2.66	0.25	0.00	1.29	0.59	0.66	0.06	0.15	82.70
Average	**29.26**	**0.08**	**16.80**	**0.92**	**27.35**	**0.38**	**3.09**	**0.77**	**0.01**	**1.12**	**0.81**	**0.11**	**0.09**	**0.25**	**81.03**
Std Dev	**3.37**	**0.01**	**0.84**	**0.30**	**1.88**	**0.03**	**0.22**	**0.66**	**0.01**	**0.15**	**0.17**	**0.16**	**0.07**	**0.06**	**2.51**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS10-Sil-7	2.59	0.00	1.92	0.08	2.15	0.03	0.47	0.03	0.00	0.11	0.12	0.00	0.04	0.04	7.51
EBS10-Sil-8	2.29	0.01	2.16	0.10	2.28	0.03	0.48	0.12	0.00	0.09	0.09	0.01	0.04	0.04	7.66
EBS10-Sil-9	2.63	0.01	1.91	0.08	2.11	0.03	0.45	0.03	0.00	0.12	0.15	0.01	0.07	0.05	7.51
EBS10-Sil-10	2.60	0.01	1.90	0.07	2.12	0.03	0.43	0.09	0.00	0.11	0.15	0.01	0.02	0.04	7.52
EBS10-Sil-11	2.70	0.01	1.74	0.07	2.21	0.03	0.38	0.08	0.00	0.11	0.17	0.01	0.00	0.05	7.51
EBS10-Sil-12	2.55	0.00	1.91	0.09	2.24	0.03	0.43	0.05	0.00	0.10	0.13	0.01	0.05	0.03	7.55
EBS10-Sil-13	2.79	0.01	1.68	0.08	2.11	0.03	0.42	0.04	0.00	0.12	0.18	0.01	0.02	0.04	7.45
EBS10-Sil-14	2.71	0.01	1.80	0.05	2.14	0.03	0.43	0.02	0.00	0.10	0.16	0.01	0.00	0.04	7.46
EBS10-Sil-15	2.56	0.01	1.88	0.08	2.25	0.03	0.45	0.05	0.00	0.08	0.16	0.01	0.00	0.03	7.55
EBS10-Sil-17	2.64	0.00	1.82	0.09	2.20	0.03	0.42	0.03	0.00	0.11	0.14	0.01	0.00	0.03	7.49
EBS10-Sil-18	2.60	0.01	1.79	0.07	2.17	0.03	0.43	0.20	0.00	0.13	0.13	0.01	0.03	0.04	7.57
EBS10-Sil-19	2.68	0.01	1.86	0.07	2.09	0.03	0.40	0.05	0.00	0.10	0.16	0.01	0.02	0.04	7.46
EBS10-Sil-20	2.73	0.01	1.77	0.05	2.17	0.03	0.39	0.04	0.00	0.12	0.16	0.01	0.04	0.04	7.48
EBS10-Sil-25	3.00	0.01	1.68	0.03	1.77	0.02	0.44	0.02	0.00	0.13	0.19	0.03	0.04	0.06	7.31
EBS10-Sil-26	3.23	0.01	1.57	0.01	1.60	0.02	0.34	0.02	0.00	0.12	0.10	0.07	0.02	0.02	7.08
Average	**2.69**	**0.01**	**1.83**	**0.07**	**2.11**	**0.03**	**0.42**	**0.06**	**0.00**	**0.11**	**0.15**	**0.01**	**0.03**	**0.04**	**7.47**
Std Dev	**0.21**	**0.00**	**0.14**	**0.02**	**0.18**	**0.00**	**0.04**	**0.05**	**0.00**	**0.01**	**0.03**	**0.02**	**0.02**	**0.01**	**0.13**
Good Points: Low-Iron Phase															
EBS10-Sil-29	50.80	0.08	19.64	0.11	4.21	0.04	1.17	0.05	0.00	0.60	0.36	0.52	0.09	0.18	77.86
EBS10-Sil-30	45.77	0.12	17.38	0.14	4.67	0.06	1.04	0.05	0.00	0.69	0.47	0.51	0.12	0.22	71.24
EBS10-Sil-32	61.29	0.01	11.76	0.35	3.26	0.05	0.46	0.03	0.00	1.89	0.63	0.22	0.06	0.13	80.14
EBS10-Sil-33	64.44	0.00	17.54	0.30	2.29	0.04	0.24	0.01	0.00	1.05	3.23	0.01	0.12	0.06	89.34

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Average	**55.57**	**0.05**	**16.58**	**0.23**	**3.61**	**0.05**	**0.73**	**0.04**	**0.00**	**1.06**	**1.17**	**0.31**	**0.10**	**0.15**	**79.64**
Std Dev	**8.76**	**0.06**	**3.37**	**0.12**	**1.05**	**0.01**	**0.45**	**0.02**	**0.00**	**0.59**	**1.38**	**0.25**	**0.03**	**0.07**	**7.48**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS10-Sil-29	3.91	0.00	1.78	0.01	0.27	0.00	0.13	0.00	0.00	0.05	0.05	0.05	0.02	0.02	6.27
EBS10-Sil-30	3.89	0.01	1.74	0.01	0.33	0.00	0.13	0.00	0.00	0.06	0.08	0.06	0.03	0.03	6.32
EBS10-Sil-32	4.50	0.00	1.02	0.02	0.20	0.00	0.05	0.00	0.00	0.15	0.09	0.02	0.01	0.02	6.05
EBS10-Sil-33	4.25	0.00	1.37	0.02	0.13	0.00	0.02	0.00	0.00	0.07	0.41	0.00	0.02	0.01	6.28
Average	**4.14**	**0.00**	**1.48**	**0.01**	**0.23**	**0.00**	**0.09**	**0.00**	**0.00**	**0.08**	**0.16**	**0.03**	**0.02**	**0.02**	**6.23**
Std Dev	**0.29**	**0.00**	**0.36**	**0.01**	**0.09**	**0.00**	**0.06**	**0.00**	**0.00**	**0.04**	**0.17**	**0.03**	**0.01**	**0.01**	**0.12**
Chlorite (analyzed with 20 mm spot)															
EBS-11															
EBS11-Chl1 20u	38.39	0.08	13.56	0.01	31.34	0.11	3.40	0.02	0.01	1.18	2.30	0.13	0.00	0.01	90.55
EBS11-Chl2 20u	36.96	0.02	12.60	0.00	30.04	0.06	3.35	0.02	0.03	1.07	2.22	0.14	0.00	0.09	86.58
Average	**37.68**	**0.05**	**13.08**	**0.01**	**30.69**	**0.09**	**3.37**	**0.02**	**0.02**	**1.13**	**2.26**	**0.13**	**0.00**	**0.05**	**88.57**
Std Dev	**1.01**	**0.04**	**0.68**	**0.01**	**0.92**	**0.04**	**0.04**	**0.00**	**0.01**	**0.08**	**0.06**	**0.01**	**0.00**	**0.05**	**2.81**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EBS11-Chl1 20u	3.96	0.01	1.65	0.00	2.70	0.01	0.52	0.00	0.00	0.13	0.46	0.02	0.00	0.00	9.45
EBS11-Chl2 20u	3.99	0.00	1.60	0.00	2.71	0.01	0.54	0.00	0.00	0.12	0.47	0.02	0.00	0.02	9.46
Average	**3.97**	**0.00**	**1.62**	**0.00**	**2.71**	**0.01**	**0.53**	**0.00**	**0.00**	**0.13**	**0.46**	**0.02**	**0.00**	**0.01**	**9.46**
Std Dev	**0.02**	**0.00**	**0.03**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**
EBS-13															
EB13-Ch-1	33.63	0.04	15.58	0.00	34.69	0.18	3.34	0.03	0.01	0.67	0.94	0.05	0.03	0.13	89.27
EB13-Ch-2	34.40	0.04	15.80	0.01	30.58	0.12	3.60	0.00	0.01	0.63	1.16	0.16	0.11	0.24	86.74
EB13-Ch-4	30.75	0.05	16.86	0.02	34.72	0.21	3.89	0.05	0.01	0.41	0.78	0.05	0.14	0.10	87.96
EB13-Ch-5	33.10	0.06	16.46	0.02	34.66	0.18	3.46	0.03	0.00	0.77	0.84	0.05	0.01	0.05	89.68
EB13-ChLD-6	36.92	0.03	15.84	0.01	30.66	0.12	3.53	0.03	0.04	1.33	1.56	0.18	0.00	0.14	90.34
Average	**33.76**	**0.04**	**16.11**	**0.01**	**33.06**	**0.16**	**3.56**	**0.03**	**0.01**	**0.76**	**1.05**	**0.10**	**0.06**	**0.13**	**88.80**

Std Dev	**2.23**	**0.01**	**0.54**	**0.01**	**2.23**	**0.04**	**0.21**	**0.02**	**0.01**	**0.34**	**0.31**	**0.06**	**0.06**	**0.07**	**1.44**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EB13-Ch-1	3.61	0.00	1.97	0.00	3.11	0.02	0.53	0.00	0.00	0.08	0.20	0.01	0.01	0.02	9.52
EB13-Ch-2	3.72	0.00	2.02	0.00	2.77	0.01	0.58	0.00	0.00	0.07	0.24	0.02	0.04	0.04	9.44
EB13-Ch-4	3.38	0.00	2.18	0.00	3.19	0.02	0.64	0.00	0.00	0.05	0.17	0.01	0.05	0.02	9.64
EB13-Ch-5	3.53	0.00	2.07	0.00	3.09	0.02	0.55	0.00	0.00	0.09	0.17	0.01	0.00	0.01	9.53
EB13-ChLD-6	3.80	0.00	1.92	0.00	2.64	0.01	0.54	0.00	0.00	0.15	0.31	0.02	0.00	0.02	9.41
Average	**3.61**	**0.00**	**2.03**	**0.00**	**2.96**	**0.01**	**0.57**	**0.00**	**0.00**	**0.09**	**0.22**	**0.01**	**0.02**	**0.02**	**9.51**
Std Dev	**0.17**	**0.00**	**0.10**	**0.00**	**0.24**	**0.00**	**0.04**	**0.00**	**0.00**	**0.04**	**0.06**	**0.01**	**0.02**	**0.01**	**0.09**
EBS-13 Metal Mount: Chlorite															
EB13M-Chl-1	39.13	0.02	14.94	0.05	30.85	0.15	1.37	0.26	0.04	1.04	0.53	0.21	0.00	0.06	88.63
EB13M-Chl-2	38.28	0.08	14.41	0.06	30.06	0.15	1.35	0.23	0.01	1.01	0.35	0.18	0.01	0.07	86.21
EB13M-Chl-3	38.47	0.08	14.57	0.07	29.59	0.14	1.39	0.21	0.01	0.97	0.48	0.31	0.06	0.09	86.39
EB13M-Chl-4	36.65	0.08	15.62	0.07	31.21	0.17	1.75	0.28	0.00	1.17	0.58	0.29	0.03	0.04	87.93
EB13M-Chl-5	36.85	0.11	15.93	0.03	31.75	0.21	1.79	0.26	0.01	1.26	0.38	0.22	0.03	0.05	88.85
EB13M-Chl-6	41.68	0.10	16.50	0.20	27.16	0.17	3.14	0.32	0.00	0.91	1.90	0.40	0.00	0.06	92.53
EB13M-Chl-7	32.51	0.07	15.64	0.59	30.86	0.25	2.84	0.35	0.03	0.70	1.71	0.18	0.00	0.08	85.78
EB13M-Chl-8	33.05	0.08	16.22	0.62	31.30	0.29	2.98	0.27	0.03	0.74	1.30	0.20	0.01	0.07	87.12
EB13M-Chl-9	32.32	0.12	15.83	0.55	31.24	0.25	2.87	0.36	0.02	0.69	1.25	0.23	0.00	0.08	85.79
EB13M-Chl-10	33.82	0.11	17.45	0.48	32.86	0.31	3.24	0.29	0.00	0.68	1.06	0.26	0.03	0.05	90.61
Average	**36.28**	**0.08**	**15.71**	**0.27**	**30.69**	**0.21**	**2.27**	**0.28**	**0.02**	**0.92**	**0.95**	**0.25**	**0.02**	**0.06**	**87.99**
Std Dev	**3.21**	**0.03**	**0.92**	**0.26**	**1.52**	**0.06**	**0.80**	**0.05**	**0.01**	**0.21**	**0.57**	**0.07**	**0.02**	**0.01**	**2.23**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EB13M-Chl-1	4.07	0.00	1.83	0.00	2.68	0.01	0.21	0.02	0.00	0.12	0.11	0.03	0.00	0.01	9.09
EB13M-Chl-2	4.09	0.01	1.81	0.00	2.68	0.01	0.21	0.02	0.00	0.12	0.07	0.02	0.00	0.01	9.05
EB13M-Chl-3	4.09	0.01	1.83	0.01	2.63	0.01	0.22	0.02	0.00	0.11	0.10	0.04	0.02	0.02	9.07
EB13M-Chl-4	3.88	0.01	1.95	0.01	2.77	0.02	0.28	0.02	0.00	0.13	0.12	0.04	0.01	0.01	9.22

EB13M-Chl-5	3.87	0.01	1.97	0.00	2.79	0.02	0.28	0.02	0.00	0.14	0.08	0.03	0.01	0.01	9.20
EB13M-Chl-6	4.06	0.01	1.89	0.02	2.21	0.01	0.46	0.03	0.00	0.09	0.36	0.05	0.00	0.01	9.19
EB13M-Chl-7	3.60	0.01	2.04	0.05	2.86	0.02	0.47	0.03	0.00	0.08	0.37	0.03	0.00	0.01	9.55
EB13M-Chl-8	3.59	0.01	2.08	0.05	2.84	0.03	0.48	0.02	0.00	0.09	0.27	0.03	0.00	0.01	9.50
EB13M-Chl-9	3.58	0.01	2.07	0.05	2.89	0.02	0.47	0.03	0.00	0.08	0.27	0.03	0.00	0.01	9.51
EB13M-Chl-10	3.54	0.01	2.15	0.04	2.87	0.03	0.50	0.02	0.00	0.08	0.22	0.03	0.01	0.01	9.49
Average	**3.84**	**0.01**	**1.96**	**0.02**	**2.72**	**0.02**	**0.36**	**0.02**	**0.00**	**0.10**	**0.20**	**0.03**	**0.01**	**0.01**	**9.29**
	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Std Dev	**0.24**	**0.00**	**0.12**	**0.02**	**0.20**	**0.01**	**0.13**	**0.00**	**0.00**	**0.02**	**0.12**	**0.01**	**0.01**	**0.00**	**0.20**
EBS-15															
Mantle around metal (stilpnomelane or aluminous glauconite?)															
EB15-Mantle-1	33.93	0.00	14.00	0.00	31.80	0.12	2.21	0.00	0.00	6.12	0.05	0.02	0.07	0.36	88.68
EB15-Mantle-2	34.28	0.02	13.21	0.00	31.49	0.11	2.50	0.00	0.01	6.63	0.12	0.01	0.08	0.33	88.79
EB15-Mantle-3	29.55	0.00	16.05	0.00	36.29	0.21	3.07	0.00	0.00	2.80	0.01	0.01	0.00	0.26	88.26
Average	**32.59**	**0.01**	**14.42**	**0.00**	**33.19**	**0.15**	**2.59**	**0.00**	**0.00**	**5.18**	**0.06**	**0.01**	**0.05**	**0.32**	**88.58**
Std Dev	**2.64**	**0.01**	**1.47**	**0.00**	**2.69**	**0.06**	**0.44**	**0.00**	**0.00**	**2.08**	**0.06**	**0.00**	**0.04**	**0.05**	**0.28**
28 Oxygen + 6(OH) (~8Si) Basis (sum excludes F & Cl)															
EB15-Mantle-1	8.035	0.000	3.908	0.000	6.298	0.024	0.780	0.000	0.001	1.552	0.022	0.005	0.055	0.144	20.62
EB15-Mantle-2	8.110	0.004	3.684	0.001	6.231	0.022	0.880	0.000	0.001	1.680	0.054	0.004	0.060	0.134	20.67
EB15-Mantle-3	7.306	0.000	4.677	0.000	7.504	0.044	1.132	0.000	0.001	0.742	0.003	0.003	0.000	0.109	21.41
Average	**7.817**	**0.001**	**4.090**	**0.000**	**6.677**	**0.030**	**0.931**	**0.000**	**0.001**	**1.325**	**0.026**	**0.004**	**0.039**	**0.129**	**20.90**
Std Dev	**0.444**	**0.002**	**0.521**	**0.000**	**0.716**	**0.012**	**0.181**	**0.000**	**0.000**	**0.509**	**0.026**	**0.001**	**0.034**	**0.018**	**0.44**
EB-15 Metal Mount: Chlorite															
EB15M-Chl-1	34.62	0.07	13.35	0.15	19.01	0.16	2.40	0.29	0.00	1.72	0.43	0.14	0.00	0.30	72.62
EB15M-Chl-2	44.45	0.06	14.53	0.15	15.09	0.12	2.23	0.20	0.00	1.70	0.85	0.41	0.12	0.28	80.18
EB15M-Chl-3	37.17	0.04	14.30	0.32	23.07	0.16	3.86	0.33	0.01	2.08	1.11	0.17	0.00	0.13	82.76
EB15M-Chl-4	35.05	0.01	13.26	0.70	29.37	0.21	3.79	0.21	0.00	1.29	2.78	0.04	0.09	0.04	86.83
EB15M-Chl-5	34.20	0.00	13.02	0.64	28.92	0.20	3.85	0.21	0.01	1.23	3.59	0.04	0.00	0.02	85.93
EB15M-Chl-6	29.92	0.07	12.40	0.45	17.86	0.15	2.99	0.34	0.02	1.72	0.47	0.05	0.06	0.32	66.83
EB15M-Chl-7	33.08	0.02	14.24	0.76	29.22	0.20	3.85	0.27	0.03	1.49	1.94	0.12	0.12	0.01	85.36
EB15M-Chl-8	32.38	0.08	14.10	0.48	20.64	0.20	3.12	0.62	0.03	1.96	0.69	0.06	0.00	0.19	74.54

EB15M-Chl-9	27.61	0.02	11.05	0.10	18.60	0.17	1.87	0.47	0.00	1.46	1.16	0.07	0.01	0.29	62.89
Average	**34.27**	**0.04**	**13.36**	**0.42**	**22.42**	**0.17**	**3.11**	**0.33**	**0.01**	**1.63**	**1.45**	**0.12**	**0.05**	**0.18**	**77.55**
Std Dev	**4.48**	**0.03**	**1.05**	**0.24**	**5.18**	**0.03**	**0.74**	**0.13**	**0.01**	**0.27**	**1.04**	**0.11**	**0.05**	**0.12**	**8.26**
28 Oxygen Basis (10 oxygen + 8(OH)) (sum excludes F & Cl)															
EB15M-Chl-1	4.21	0.01	1.91	0.01	1.94	0.02	0.44	0.03	0.00	0.22	0.10	0.02	0.00	0.06	8.91
EB15M-Chl-2	4.66	0.00	1.80	0.01	1.32	0.01	0.35	0.02	0.00	0.19	0.17	0.05	0.04	0.05	8.59
EB15M-Chl-3	4.04	0.00	1.83	0.03	2.10	0.01	0.62	0.03	0.00	0.24	0.23	0.02	0.00	0.02	9.17

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Atoms per Formula Unit (sum excludes F&Cl)														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EB15M-Chl-4	3.81	0.00	1.70	0.06	2.67	0.02	0.61	0.02	0.00	0.15	0.59	0.01	0.03	0.01	9.63
EB15M-Chl-5	3.76	0.00	1.69	0.06	2.66	0.02	0.63	0.02	0.00	0.15	0.76	0.01	0.00	0.00	9.75
EB15M-Chl-6	4.02	0.01	1.96	0.05	2.01	0.02	0.60	0.04	0.00	0.25	0.12	0.01	0.02	0.07	9.08
EB15M-Chl-7	3.67	0.00	1.86	0.07	2.71	0.02	0.64	0.02	0.00	0.18	0.42	0.02	0.04	0.00	9.60
EB15M-Chl-8	3.92	0.01	2.01	0.05	2.09	0.02	0.56	0.06	0.00	0.25	0.16	0.01	0.00	0.04	9.15
EB15M-Chl-9	4.02	0.00	1.89	0.01	2.26	0.02	0.40	0.06	0.00	0.23	0.33	0.01	0.01	0.07	9.24
Average	**4.01**	**0.00**	**1.85**	**0.04**	**2.19**	**0.02**	**0.54**	**0.03**	**0.00**	**0.21**	**0.32**	**0.02**	**0.02**	**0.04**	**9.24**
Std Dev	**0.28**	**0.00**	**0.10**	**0.02**	**0.42**	**0.00**	**0.11**	**0.01**	**0.00**	**0.04**	**0.22**	**0.01**	**0.02**	**0.03**	**0.35**

APPENDIX B:

Electron Microprobe Mineral Chemistry

Feldspar

Sanidine	(Low totals due to Ba content)			Kfs = Kspar		San = Sanidine		Afs = Alkali feldspar							
	Weight Percent Components														
Label	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**Total**
MRBentontite															
MRBENT-F3Kfs1	63.50	0.00	19.70	0.01	0.15	0.01	0.00	0.01	0.00	0.18	3.13	11.29	0.03	0.00	97.98
MRBENT-F3Kfs1-2	64.15	0.01	19.31	0.00	0.16	0.00	0.00	0.00	0.00	0.17	3.13	11.19	0.00	0.00	98.12
MRBENT-F3-Kf2-1	65.81	0.01	19.25	0.00	0.15	0.00	0.00	0.00	0.02	0.17	3.36	11.47	0.00	0.00	100.25
AVE	**64.49**	**0.01**	**19.42**	**0.00**	**0.15**	**0.00**	**0.00**	**0.00**	**0.01**	**0.17**	**3.21**	**11.32**	**0.01**	**0.00**	**98.78**
STD DEV	**0.97**	**0.01**	**0.20**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.11**	**0.11**	**0.01**	**0.00**	**1.04**
8 Oxygen Basis (sum excludes F&Cl)															
MRBENT-F3Kfs1	2.95	0.00	1.08	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.28	0.67	0.00	0.00	4.99
MRBENT-F3Kfs1-2	2.97	0.00	1.05	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.28	0.66	0.00	0.00	4.98
MRBENT-F3-Kf2-1	2.98	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.29	0.66	0.00	0.00	4.98
AVE	**2.97**	**0.00**	**1.05**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.29**	**0.66**	**0.00**	**0.00**	**4.98**
STD DEV	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**
EBS-1															
EBS1-F1-Kfs1-1	65.33	0.00	19.06	0.01	0.11	0.00	0.00	0.01	0.04	0.19	2.56	12.50	0.00	0.01	99.82
EBS1-F1-Kfs1-2	65.12	0.01	18.96	0.00	0.10	0.02	0.00	0.00	0.00	0.18	2.56	12.42	0.02	0.00	99.38
EBS1-F1-Kfs1-3	65.45	0.00	18.70	0.00	0.12	0.00	0.00	0.00	0.00	0.18	2.58	12.40	0.00	0.00	99.45
EBS1-F3-Kfs2-1	66.34	0.01	18.80	0.01	0.12	0.02	0.00	0.00	0.03	0.17	3.52	11.33	0.00	0.00	100.35
EBS1-F3-Kfs2-2	66.42	0.02	18.71	0.00	0.11	0.00	0.00	0.00	0.00	0.16	3.50	11.36	0.00	0.00	100.30
AVE	**65.73**	**0.01**	**18.85**	**0.01**	**0.11**	**0.01**	**0.00**	**0.00**	**0.02**	**0.17**	**2.94**	**12.00**	**0.00**	**0.00**	**99.86**
STD DEV	**0.60**	**0.01**	**0.16**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.02**	**0.01**	**0.52**	**0.60**	**0.01**	**0.00**	**0.46**
8 Oxygen Basis (sum excludes F&Cl)															
EBS1-F1-Kfs1-1	2.98	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.23	0.73	0.00	0.00	4.98
EBS1-F1-Kfs1-2	2.99	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.23	0.73	0.00	0.00	4.98
EBS1-F1-Kfs1-3	3.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.23	0.72	0.00	0.00	4.97
EBS1-F3-Kfs2-1	3.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.31	0.65	0.00	0.00	4.98
EBS1-F3-Kfs2-2	3.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.31	0.66	0.00	0.00	4.98
AVE	**2.99**	**0.00**	**1.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.26**	**0.70**	**0.00**	**0.00**	**4.98**
STD DEV	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.04**	**0.00**	**0.00**	**0.00**
EBS 2															
EBS2-F1-Kfs1-1	65.04	0.00	18.79	0.00	0.15	0.01	0.01	0.00	0.02	0.17	3.51	10.65	0.00	0.01	98.37
EBS2-F1-Kfs1-2	65.10	0.00	18.77	0.00	0.14	0.00	0.00	0.01	0.01	0.18	3.60	10.61	0.00	0.01	98.43
EBS2-F2-Kfs2-1	65.72	0.00	18.92	0.01	0.08	0.00	0.00	0.00	0.02	0.18	3.39	11.44	0.00	0.00	99.77
EBS2-F2-Kfs2-2	66.22	0.00	18.85	0.02	0.07	0.00	0.00	0.00	0.02	0.19	3.38	11.40	0.01	0.00	100.15

	Weight Percent Components														
Label	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**Total**
EBS2-F2-Kfs3-1	65.98	0.01	18.85	0.01	0.09	0.00	0.00	0.00	0.00	0.18	3.39	11.51	0.03	0.00	100.03
EBS2-F2-Kfs3-2	66.47	0.00	18.60	0.00	0.10	0.02	0.00	0.01	0.01	0.18	3.40	11.46	0.00	0.00	100.25
AVE	**65.75**	**0.00**	**18.80**	**0.01**	**0.11**	**0.01**	**0.00**	**0.00**	**0.01**	**0.18**	**3.45**	**11.18**	**0.01**	**0.00**	**99.50**
STD DEV	**0.59**	**0.00**	**0.11**	**0.01**	**0.03**	**0.01**	**0.01**	**0.00**	**0.01**	**0.01**	**0.09**	**0.43**	**0.01**	**0.00**	**0.87**
8 Oxygen Basis (sum excludes F&Cl)															
EBS2-F1-Kfs1-1	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.31	0.63	0.00	0.00	4.97
EBS2-F1-Kfs1-2	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.32	0.62	0.00	0.00	4.97
EBS2-F2-Kfs2-1	2.99	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.66	0.00	0.00	4.98
EBS2-F2-Kfs2-2	3.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.66	0.00	0.00	4.97
EBS2-F2-Kfs3-1	3.00	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.00	0.00	4.98
EBS2-F2-Kfs3-2	3.01	0.00	0.99	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.66	0.00	0.00	4.97
AVE	**3.00**	**0.00**	**1.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.30**	**0.65**	**0.00**	**0.00**	**4.98**
STD DEV	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	**0.01**
EBS-6															
EBS6-F2-Kf1-1	64.78	0.01	18.74	0.00	0.12	0.02	0.00	0.00	0.02	0.17	3.03	11.30	0.08	0.00	98.28
EBS6-F2-Kf1-2	65.14	0.00	18.59	0.01	0.14	0.01	0.01	0.00	0.02	0.18	3.09	11.30	0.00	0.00	98.48
8 Oxygen Basis (sum excludes F&Cl)															
EBS6-F2-Kf1-1	2.99	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.27	0.67	0.01	0.00	4.98
EBS6-F2-Kf1-2	3.00	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.28	0.66	0.00	0.00	4.96
EBS-7															
EBS7-Afs1-1	65.63	0.01	18.84	0.01	0.16	0.00	0.00	0.02	0.05	0.16	3.39	11.58	0.10	0.00	99.90
8 Oxygen Basis (sum excludes F&Cl)															
EBS7-Afs1-1	2.99	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.01	0.00	5.00
EBS-9															
EBS9-Afs1-1	65.39	0.01	18.74	0.00	0.18	0.02	0.01	0.01	0.00	0.17	3.46	11.56	0.12	0.00	99.62
8 Oxygen Basis (sum excludes F&Cl)															
EBS9-Afs1-1	2.99	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.31	0.67	0.02	0.00	5.00
EBS-10															
EBS10-Afs-1	63.28	0.02	18.43	0.00	0.17	0.00	0.02	0.01	0.00	0.25	2.99	11.19	0.06	0.00	96.40
EBS10-Afs-2	63.71	0.00	18.58	0.00	0.19	0.00	0.00	0.00	0.00	0.27	3.68	10.38	0.00	0.00	96.80

	Weight Percent Components														
Label	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**Total**
EBS10-Afs3-1	64.91	0.02	18.82	0.01	0.15	0.00	0.00	0.01	0.00	0.19	3.22	11.39	0.03	0.00	98.74
EBS10-Afs-4	65.49	0.00	18.99	0.00	0.18	0.00	0.00	0.03	0.02	0.19	3.24	11.22	0.07	0.00	99.40
AVE	**64.35**	**0.01**	**18.70**	**0.00**	**0.17**	**0.00**	**0.00**	**0.01**	**0.01**	**0.23**	**3.28**	**11.04**	**0.04**	**0.00**	**97.83**
STD DEV	**1.03**	**0.01**	**0.25**	**0.00**	**0.02**	**0.00**	**0.00**	**0.01**	**0.01**	**0.04**	**0.29**	**0.45**	**0.03**	**0.00**	**1.46**
8 Oxygen Basis (sum excludes F&Cl)															
EBS10-Afs-1	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.27	0.67	0.01	0.00	4.98
EBS10-Afs-2	2.98	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.33	0.62	0.00	0.00	4.98
EBS10-Afs3-1	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.29	0.67	0.00	0.00	4.98
EBS10-Afs-4	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.29	0.65	0.01	0.00	4.97
AVE	**2.99**	**0.00**	**1.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.30**	**0.65**	**0.01**	**0.00**	**4.98**
STD DEV	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.02**	**0.00**	**0.00**	**0.00**
EBS-11															
EBS11-Afs-1	65.58	0.01	18.37	0.00	0.14	0.00	0.00	0.00	0.01	0.24	3.71	10.40	0.20	0.00	98.58
EBS11-Afs-2	65.36	0.00	18.52	0.01	0.11	0.01	0.01	0.00	0.00	0.17	3.41	11.39	0.00	0.00	98.97
EBS11-Afs-4	66.72	0.00	18.76	0.00	0.18	0.00	0.01	0.00	0.01	0.17	4.18	10.34	0.03	0.00	100.39
AVE	**65.89**	**0.00**	**18.55**	**0.00**	**0.14**	**0.00**	**0.00**	**0.00**	**0.01**	**0.20**	**3.77**	**10.71**	**0.08**	**0.00**	**99.31**
STD DEV	**0.73**	**0.01**	**0.20**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.01**	**0.04**	**0.39**	**0.59**	**0.11**	**0.00**	**0.95**
8 Oxygen Basis (sum excludes F&Cl)															
EBS11-Afs-1	3.02	0.00	1.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.33	0.61	0.03	0.00	4.97
EBS11-Afs-2	3.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.00	0.00	4.98
EBS11-Afs-4	3.01	0.00	1.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.37	0.59	0.00	0.00	4.98
AVE	**3.01**	**0.00**	**1.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.33**	**0.62**	**0.01**	**0.00**	**4.98**
STD DEV	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.04**	**0.02**	**0.00**	**0.01**
EBS-12															
EBS12-Afs-1	62.89	0.02	18.55	0.02	0.17	0.00	0.00	0.00	0.00	0.17	3.28	11.07	0.00	0.00	96.17
EBS12-Afs-1	63.58	0.01	18.66	0.00	0.19	0.00	0.00	0.00	0.00	0.18	3.26	10.96	0.00	0.01	96.87
EBS12-Afs-2	61.36	0.00	18.67	0.00	0.18	0.00	0.00	0.02	0.00	0.20	3.19	10.03	0.00	0.00	93.64
EBS12-Afs-3	64.53	0.03	18.48	0.01	0.11	0.00	0.00	0.00	0.00	0.15	3.27	11.42	0.00	0.00	98.01
AVE	**63.09**	**0.01**	**18.59**	**0.01**	**0.16**	**0.00**	**0.00**	**0.00**	**0.00**	**0.18**	**3.25**	**10.87**	**0.00**	**0.00**	**96.17**
STD DEV	**1.34**	**0.01**	**0.09**	**0.01**	**0.04**	**0.00**	**0.00**	**0.01**	**0.00**	**0.02**	**0.04**	**0.59**	**0.00**	**0.00**	**1.85**

8 Oxygen Basis (sum excludes F&Cl)															
EBS12-Afs-1	2.97	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.00	0.00	4.99
EBS12-Afs-1	2.98	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.30	0.66	0.00	0.00	4.98
EBS12-Afs-2	2.96	0.00	1.06	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.30	0.62	0.00	0.00	4.96
EBS12-Afs-3	2.99	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.29	0.68	0.00	0.00	4.99

	Weight Percent Components														
Label	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**Total**
AVE	**2.98**	**0.00**	**1.03**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.30**	**0.65**	**0.00**	**0.00**	**4.98**
STD DEV	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.03**	**0.00**	**0.00**	**0.01**
EB-13															
EB13-San-1	66.07	0.00	18.92	0.00	0.21	0.00	0.00	0.02	0.03	0.24	3.68	10.97	0.00	0.00	100.14
EB13-San-2	65.48	0.00	18.75	0.00	0.19	0.00	0.01	0.00	0.01	0.15	3.35	11.50	0.11	0.00	99.51
EB13-San-3	64.79	0.00	18.97	0.00	0.24	0.00	0.00	0.00	0.02	0.18	3.17	11.37	0.00	0.00	98.74
EB13-San-4	65.48	0.00	19.14	0.01	0.19	0.01	0.00	0.00	0.00	0.21	3.46	11.27	0.06	0.00	99.80
Average	**65.46**	**0.00**	**18.94**	**0.00**	**0.21**	**0.00**	**0.00**	**0.00**	**0.01**	**0.19**	**3.42**	**11.28**	**0.04**	**0.00**	**99.55**
Std Dev	**0.52**	**0.00**	**0.16**	**0.00**	**0.02**	**0.01**	**0.00**	**0.01**	**0.01**	**0.04**	**0.21**	**0.23**	**0.05**	**0.00**	**0.60**
8 Oxygen Basis (sum excludes F&Cl)															
EB13-San-1	2.99	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.32	0.63	0.00	0.00	4.98
EB13-San-2	3.00	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.02	0.00	4.99
EB13-San-3	2.98	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.28	0.67	0.00	0.00	4.98
EB13-San-4	2.98	0.00	1.03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.31	0.65	0.01	0.00	4.99
Average	**2.99**	**0.00**	**1.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.30**	**0.66**	**0.01**	**0.00**	**4.98**
Std Dev	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.01**	**0.00**	**0.01**
EB-15															
Sanidine															
EB15-San-1	66.40	0.01	19.14	0.01	0.12	0.01	0.00	0.00	0.00	0.15	3.45	11.70	0.00	0.00	100.97
EB15-San-2	64.91	0.01	19.00	0.00	0.11	0.00	0.00	0.02	0.00	0.19	2.47	12.71	0.00	0.00	99.43
EB15-San-3	64.80	0.00	18.70	0.01	0.24	0.00	0.00	0.00	0.01	0.18	2.49	12.78	0.01	0.00	99.21
Average	**65.37**	**0.00**	**18.95**	**0.01**	**0.16**	**0.00**	**0.00**	**0.01**	**0.00**	**0.17**	**2.81**	**12.40**	**0.00**	**0.00**	**99.87**
Std Dev	**0.89**	**0.00**	**0.22**	**0.01**	**0.07**	**0.01**	**0.00**	**0.01**	**0.01**	**0.02**	**0.56**	**0.60**	**0.01**	**0.00**	**0.96**
8 Oxygen Basis (sum excludes F&Cl)															
EB15-San-1	2.99	0.00	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.30	0.67	0.00	0.00	4.99
EB15-San-2	2.98	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.22	0.74	0.00	0.00	4.99
EB15-San-3	2.99	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.22	0.75	0.00	0.00	4.99
Average	**2.99**	**0.00**	**1.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.25**	**0.72**	**0.00**	**0.00**	**4.99**

Std Dev	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.04**	**0.00**	**0.00**	**0.00**
EB-16															
Sanidine															
EB16-San-1	65.12	0.01	18.61	0.00	0.10	0.01	0.01	0.02	0.00	0.16	2.64	12.64	0.00	0.01	99.33
EB16-San-2	64.68	0.02	19.03	0.00	0.13	0.00	0.00	0.00	0.00	0.16	2.51	12.72	0.05	0.00	99.28

	Weight Percent Components														
Label	**SiO2**	**TiO2**	**Al2O3**	**Cr2O3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na2O**	**K2O**	**F**	**Cl**	**Total**
EB16-San-3	62.43	0.00	18.49	0.00	0.11	0.00	0.00	0.00	0.00	0.21	2.28	12.19	0.00	0.00	95.72
EB16-San-4	62.49	0.00	18.62	0.00	0.16	0.00	0.00	0.00	0.02	0.23	2.33	12.06	0.00	0.00	95.90
Average	**63.68**	**0.01**	**18.69**	**0.00**	**0.12**	**0.00**	**0.00**	**0.01**	**0.00**	**0.19**	**2.44**	**12.40**	**0.01**	**0.00**	**97.56**
Std Dev	**1.42**	**0.01**	**0.24**	**0.00**	**0.03**	**0.00**	**0.01**	**0.01**	**0.01**	**0.03**	**0.16**	**0.33**	**0.03**	**0.00**	**2.02**
8 Oxygen Basis (sum excludes F&Cl)															
EB16-San-1	2.99	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.23	0.74	0.00	0.00	4.99
EB16-San-2	2.98	0.00	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.22	0.75	0.01	0.00	4.99
EB16-San-3	2.98	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.21	0.74	0.00	0.00	4.98
EB16-San-4	2.97	0.00	1.04	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.21	0.73	0.00	0.00	4.98
Average	**2.98**	**0.00**	**1.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.22**	**0.74**	**0.00**	**0.00**	**4.99**
Std Dev	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.01**
EB-17															
Sanidine															
EB17-San-1	65.51	0.01	18.83	0.00	0.19	0.00	0.00	0.00	0.00	0.18	3.46	11.49	0.00	0.01	99.69
EB17-San-2	65.12	0.00	18.66	0.00	0.13	0.02	0.00	0.00	0.00	0.17	3.43	11.50	0.00	0.00	99.03
Average	**65.32**	**0.01**	**18.74**	**0.00**	**0.16**	**0.01**	**0.00**	**0.00**	**0.00**	**0.18**	**3.45**	**11.49**	**0.00**	**0.01**	**99.36**
Std Dev	**0.27**	**0.01**	**0.12**	**0.00**	**0.05**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.01**	**0.00**	**0.01**	**0.47**
8 Oxygen Basis (sum excludes F&Cl)															
EB17-San-1	2.99	0.00	1.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.31	0.67	0.00	0.00	4.99
EB17-San-2	2.99	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.31	0.67	0.00	0.00	4.99
Average	**2.99**	**0.00**	**1.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.31**	**0.67**	**0.00**	**0.00**	**4.99**
Std Dev	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Plagioclase															
	Weight Percent Components														
Label	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO*	MnO	MgO	NiO	ZnO	CaO	Na_2O	K_2O	F	Cl	Total
MRBentontite															
MRBENT-F3-Plg1-1	63.29	0.02	23.21	0.00	0.20	0.00	0.00	0.01	0.01	4.10	8.32	1.09	0.00	0.00	100.26
MRBENT-F3-Plg1-2	63.12	0.00	23.19	0.01	0.21	0.00	0.00	0.00	0.03	4.10	8.05	1.24	0.02	0.01	99.95
MRBENT-F3-Plg1-3	64.10	0.00	23.18	0.00	0.20	0.00	0.00	0.04	0.02	4.14	8.55	1.13	0.00	0.00	101.36
AVE	**63.50**	**0.01**	**23.19**	**0.01**	**0.20**	**0.00**	**0.00**	**0.02**	**0.02**	**4.11**	**8.31**	**1.16**	**0.01**	**0.00**	**100.52**
STD DEV	**0.43**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.01**	**0.02**	**0.21**	**0.06**	**0.01**	**0.00**	**0.61**
8 Oxygen Basis (sum excludes F&Cl)															
MRBENT-F3-Plg1-1	2.80	0.00	1.21	0.00	0.01	0.00	0.00	0.00	0.00	0.19	0.71	0.06	0.00	0.00	4.98
MRBENT-F3-Plg1-2	2.80	0.00	1.21	0.00	0.01	0.00	0.00	0.00	0.00	0.19	0.69	0.07	0.00	0.00	4.98
MRBENT-F3-Plg1-3	2.80	0.00	1.20	0.00	0.01	0.00	0.00	0.00	0.00	0.19	0.73	0.06	0.00	0.00	4.99
AVE	**2.80**	**0.00**	**1.21**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.19**	**0.71**	**0.07**	**0.00**	**0.00**	**4.98**
STD DEV	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**
EBS-1															
EBS1-F1-Pl1-1	61.60	0.00	23.81	0.01	0.19	0.00	0.00	0.00	0.03	5.93	7.47	1.00	0.00	0.00	100.05
EBS1-F1-Pl1-2	60.71	0.00	25.07	0.00	0.21	0.00	0.00	0.02	0.02	6.66	7.17	0.79	0.10	0.00	100.71
AVE	**61.16**	**0.00**	**24.44**	**0.00**	**0.20**	**0.00**	**0.00**	**0.01**	**0.02**	**6.30**	**7.32**	**0.89**	**0.05**	**0.00**	**100.38**
STD DEV	**0.63**	**0.00**	**0.89**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**	**0.01**	**0.52**	**0.21**	**0.14**	**0.00**	**0.00**	**0.47**
8 Oxygen Basis (sum excludes F&Cl)															
EBS1-F1-Pl1-1	2.74	0.00	1.25	0.00	0.01	0.00	0.00	0.00	0.00	0.28	0.64	0.06	0.00	0.00	4.98
EBS1-F1-Pl1-2	2.69	0.00	1.31	0.00	0.01	0.00	0.00	0.00	0.00	0.32	0.62	0.04	0.01	0.00	4.99
AVE	**2.72**	**0.00**	**1.28**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.30**	**0.63**	**0.05**	**0.01**	**0.00**	**4.99**
STD DEV	**0.04**	**0.00**	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.01**	**0.00**	**0.00**	**0.00**
EBS-2															
EBS2-F3-Plg1-1	63.55	0.01	23.36	0.00	0.21	0.00	0.00	0.01	0.01	4.57	8.54	0.91	0.00	0.01	101.19
EBS2-F3-Plg1-2	62.98	0.02	23.45	0.00	0.23	0.00	0.00	0.00	0.00	4.80	8.49	0.89	0.16	0.01	100.97
AVE	**63.27**	**0.02**	**23.41**	**0.00**	**0.22**	**0.00**	**0.00**	**0.01**	**0.00**	**4.68**	**8.51**	**0.90**	**0.08**	**0.01**	**101.08**
STD DEV	**0.40**	**0.00**	**0.06**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**	**0.00**	**0.16**	**0.03**	**0.01**	**0.00**	**0.00**	**0.16**
8 Oxygen Basis (sum excludes F&Cl)															
EBS2-F3-Plg1-1	2.79	0.00	1.21	0.00	0.01	0.00	0.00	0.00	0.00	0.21	0.73	0.05	0.00	0.00	5.00
EBS2-F3-Plg1-2	2.78	0.00	1.22	0.00	0.01	0.00	0.00	0.00	0.00	0.23	0.73	0.05	0.02	0.00	5.01
AVE	**2.78**	**0.00**	**1.21**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.22**	**0.73**	**0.05**	**0.01**	**0.00**	**5.00**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
STD DEV	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**
EBS-4															
EBS4-AltPlag1-1	68.44	0.22	19.26	0.00	1.22	0.02	0.35	0.02	0.00	1.64	3.98	6.92	0.02	0.02	102.10
EBS4-AltPlag1-2	61.37	0.34	24.68	0.00	1.18	0.01	0.40	0.00	0.02	3.49	4.31	3.94	0.00	0.03	99.78
AVE	**64.90**	**0.28**	**21.97**	**0.00**	**1.20**	**0.01**	**0.37**	**0.01**	**0.01**	**2.57**	**4.15**	**5.43**	**0.01**	**0.03**	**100.94**
STD DEV	**5.00**	**0.08**	**3.84**	**0.00**	**0.03**	**0.00**	**0.04**	**0.02**	**0.02**	**1.31**	**0.23**	**2.10**	**0.00**	**0.00**	**1.64**
8 Oxygen Basis (sum excludes F&Cl)															
EBS4-AltPlag1-1	2.99	0.01	0.99	0.00	0.04	0.00	0.02	0.00	0.00	0.08	0.34	0.39	0.00	0.00	4.87
EBS4-AltPlag1-2	2.74	0.01	1.30	0.00	0.04	0.00	0.03	0.00	0.00	0.17	0.37	0.22	0.00	0.00	4.89
AVE	**2.87**	**0.01**	**1.15**	**0.00**	**0.04**	**0.00**	**0.02**	**0.00**	**0.00**	**0.12**	**0.36**	**0.31**	**0.00**	**0.00**	**4.88**
STD DEV	**0.18**	**0.00**	**0.22**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.03**	**0.11**	**0.00**	**0.00**	**0.02**
EBS-9															
EBS9-Ab1 (vfg)	68.43	0.05	20.33	0.00	0.36	0.00	0.06	0.00	0.00	0.11	11.19	0.11	0.06	0.01	100.68
EBS9-Pl1-1	61.98	0.00	23.57	0.00	0.28	0.00	0.01	0.00	0.00	5.27	8.01	0.99	0.00	0.00	100.12
AVE	**65.20**	**0.03**	**21.95**	**0.00**	**0.32**	**0.00**	**0.04**	**0.00**	**0.00**	**2.69**	**9.60**	**0.55**	**0.03**	**0.01**	**100.40**
STD DEV	**4.56**	**0.04**	**2.29**	**0.00**	**0.05**	**0.00**	**0.04**	**0.00**	**0.00**	**3.65**	**2.25**	**0.62**	**0.04**	**0.00**	**0.40**
8 Oxygen Basis (sum excludes F&Cl)															
EBS9-Ab1 (vfg)	3.01	0.00	1.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.98	0.01	0.01	0.00	5.02
EBS9-Pl1-1	2.76	0.00	1.24	0.00	0.01	0.00	0.00	0.00	0.00	0.25	0.69	0.06	0.00	0.00	5.00
AVE	**2.89**	**0.00**	**1.12**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.13**	**0.84**	**0.03**	**0.00**	**0.00**	**5.01**
STD DEV	**0.18**	**0.00**	**0.17**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.17**	**0.21**	**0.04**	**0.00**	**0.00**	**0.02**
EBS-10															
EBS10-Pl-1	63.53	0.02	22.85	0.00	0.26	0.02	0.00	0.00	0.01	4.46	8.36	1.00	0.00	0.00	100.51
EBS10-Pl-2	60.50	0.00	24.31	0.00	0.30	0.02	0.00	0.00	0.00	6.22	7.41	0.77	0.00	0.00	99.53
EBS10-Pl2-1	60.52	0.03	24.57	0.01	0.26	0.00	0.01	0.02	0.02	6.00	7.44	0.86	0.00	0.00	99.74
EBS10-Pl-4	64.03	0.00	22.66	0.01	0.27	0.02	0.00	0.00	0.00	3.53	7.95	1.17	0.09	0.00	99.70
AVE	**62.15**	**0.01**	**23.60**	**0.00**	**0.27**	**0.02**	**0.01**	**0.00**	**0.01**	**5.05**	**7.79**	**0.95**	**0.02**	**0.00**	**99.87**
STD DEV	**1.90**	**0.01**	**0.98**	**0.01**	**0.02**	**0.01**	**0.00**	**0.01**	**0.01**	**1.28**	**0.46**	**0.18**	**0.04**	**0.00**	**0.44**
8 Oxygen Basis (sum excludes F&Cl)															
EBS10-Pl-1	2.80	0.00	1.19	0.00	0.01	0.00	0.00	0.00	0.00	0.21	0.72	0.06	0.00	0.00	4.99
EBS10-Pl-2	2.71	0.00	1.28	0.00	0.01	0.00	0.00	0.00	0.00	0.30	0.64	0.04	0.00	0.00	4.99

EBS10-Pl2-1	2.71	0.00	1.29	0.00	0.01	0.00	0.00	0.00	0.00	0.29	0.64	0.05	0.00	0.00	4.99

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
EBS10-Pl-4	2.84	0.00	1.18	0.00	0.01	0.00	0.00	0.00	0.00	0.17	0.68	0.07	0.01	0.00	4.95
AVE	**2.76**	**0.00**	**1.24**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.24**	**0.67**	**0.05**	**0.00**	**0.00**	**4.98**
STD DEV	**0.07**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.03**	**0.01**	**0.01**	**0.00**	**0.02**
EBS-11															
EBS11-Pl-1	60.70	0.02	24.40	0.00	0.23	0.00	0.01	0.00	0.02	6.79	7.44	0.74	0.00	0.00	100.35
EBS11-Pl-2	62.65	0.02	22.87	0.00	0.22	0.01	0.00	0.01	0.02	4.45	8.37	1.00	0.00	0.00	99.62
AVE	**61.68**	**0.02**	**23.63**	**0.00**	**0.23**	**0.00**	**0.01**	**0.01**	**0.02**	**5.62**	**7.90**	**0.87**	**0.00**	**0.00**	**99.98**
STD DEV	**1.38**	**0.00**	**1.08**	**0.00**	**0.01**	**0.00**	**0.00**	**0.01**	**0.01**	**1.65**	**0.66**	**0.18**	**0.00**	**0.00**	**0.51**
8 Oxygen Basis (sum excludes F&Cl)															
EBS11-Pl-1	2.70	0.00	1.28	0.00	0.01	0.00	0.00	0.00	0.00	0.32	0.64	0.04	0.00	0.00	5.00
EBS11-Pl-2	2.79	0.00	1.20	0.00	0.01	0.00	0.00	0.00	0.00	0.21	0.72	0.06	0.00	0.00	5.00
AVE	**2.75**	**0.00**	**1.24**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.27**	**0.68**	**0.05**	**0.00**	**0.00**	**5.00**
STD DEV	**0.06**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.08**	**0.06**	**0.01**	**0.00**	**0.00**	**0.00**
EBS-12															
EBS12-Pl-1	59.53	0.00	26.09	0.00	0.24	0.00	0.00	0.00	0.03	8.05	6.90	0.57	0.01	0.00	101.42
EBS12-Pl-1	60.59	0.00	26.57	0.00	0.27	0.00	0.01	0.02	0.00	7.92	7.16	0.59	0.07	0.01	103.18
EBS12-Pl-2	62.17	0.00	23.18	0.02	0.23	0.00	0.00	0.01	0.01	4.88	8.04	1.01	0.02	0.01	99.57
AVE	**60.76**	**0.00**	**25.28**	**0.01**	**0.25**	**0.00**	**0.00**	**0.01**	**0.01**	**6.95**	**7.37**	**0.72**	**0.03**	**0.00**	**101.39**
STD DEV	**1.33**	**0.00**	**1.83**	**0.01**	**0.02**	**0.00**	**0.00**	**0.01**	**0.02**	**1.79**	**0.60**	**0.25**	**0.03**	**0.00**	**1.80**
8 Oxygen Basis (sum excludes F&Cl)															
EBS12-Pl-1	1.97	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.29	0.44	0.02	0.00	0.00	3.75
EBS12-Pl-1	1.97	0.00	1.02	0.00	0.01	0.00	0.00	0.00	0.00	0.28	0.45	0.02	0.01	0.00	3.76
EBS12-Pl-2	2.08	0.00	0.91	0.00	0.01	0.00	0.00	0.00	0.00	0.18	0.52	0.04	0.00	0.00	3.74
AVE	**2.01**	**0.00**	**0.98**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.47**	**0.03**	**0.00**	**0.00**	**3.75**
STD DEV	**0.06**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.04**	**0.01**	**0.00**	**0.00**	**0.01**
EB-15															
EB15-Plg-1	59.60	0.01	25.86	0.00	0.20	0.00	0.00	0.00	0.00	7.22	7.00	0.73	0.00	0.01	100.63
EB15-Plg-2	59.55	0.00	26.03	0.00	0.18	0.02	0.01	0.00	0.00	7.30	6.88	0.72	0.04	0.00	100.71
EB15-Plg-3	61.96	0.03	23.89	0.00	0.26	0.00	0.00	0.00	0.01	5.48	7.94	0.86	0.14	0.00	100.52

Average	**60.37**	**0.01**	**25.26**	**0.00**	**0.21**	**0.01**	**0.00**	**0.00**	**0.00**	**6.67**	**7.27**	**0.77**	**0.06**	**0.00**	**100.62**
Std Dev	**1.38**	**0.01**	**1.19**	**0.00**	**0.04**	**0.01**	**0.00**	**0.00**	**0.01**	**1.03**	**0.58**	**0.08**	**0.07**	**0.00**	**0.10**
8 Oxygen Basis (sum excludes F&Cl)															

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
EB15-Plg-1	2.65	0.00	1.35	0.00	0.01	0.00	0.00	0.00	0.00	0.34	0.60	0.04	0.00	0.00	5.00
EB15-Plg-2	2.64	0.00	1.36	0.00	0.01	0.00	0.00	0.00	0.00	0.35	0.59	0.04	0.01	0.00	4.99
EB15-Plg-3	2.75	0.00	1.25	0.00	0.01	0.00	0.00	0.00	0.00	0.26	0.68	0.05	0.02	0.00	5.00
Average	**2.68**	**0.00**	**1.32**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.32**	**0.63**	**0.04**	**0.01**	**0.00**	**5.00**
Std Dev	**0.06**	**0.00**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.05**	**0.00**	**0.01**	**0.00**	**0.00**
EB-16															
EB16-Pl-1	61.59	0.01	23.61	0.02	0.26	0.00	0.00	0.00	0.03	5.31	7.85	0.91	0.00	0.00	99.59
EB16-Pl-2	59.36	0.01	25.39	0.00	0.33	0.02	0.00	0.00	0.00	6.77	7.15	0.69	0.04	0.00	99.75
Average	**60.48**	**0.01**	**24.50**	**0.01**	**0.29**	**0.01**	**0.00**	**0.00**	**0.02**	**6.04**	**7.50**	**0.80**	**0.02**	**0.00**	**99.67**
Std Dev	**1.58**	**0.00**	**1.25**	**0.01**	**0.05**	**0.02**	**0.00**	**0.00**	**0.02**	**1.03**	**0.49**	**0.16**	**0.03**	**0.00**	**0.11**
8 Oxygen Basis (sum excludes F&Cl)															
EB16-Pl-1	2.75	0.00	1.24	0.00	0.01	0.00	0.00	0.00	0.00	0.25	0.68	0.05	0.00	0.00	4.99
EB16-Pl-2	2.66	0.00	1.34	0.00	0.01	0.00	0.00	0.00	0.00	0.33	0.62	0.04	0.01	0.00	5.00
Average	**2.71**	**0.00**	**1.29**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.29**	**0.65**	**0.05**	**0.00**	**0.00**	**5.00**
Std Dev	**0.06**	**0.00**	**0.07**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.04**	**0.01**	**0.00**	**0.00**	**0.01**
EB-17															
EB17-Pl-1	63.37	0.03	23.41	0.01	0.21	0.00	0.00	0.00	0.00	4.44	8.44	0.95	0.02	0.00	100.88
EB17-Pl-2	61.48	0.01	24.62	0.01	0.29	0.02	0.00	0.01	0.00	6.08	7.63	0.81	0.00	0.00	100.95
EB17-Pl-3	61.73	0.03	24.10	0.01	0.40	0.00	0.00	0.00	0.03	5.39	7.73	0.98	0.07	0.00	100.43
Average	**62.19**	**0.02**	**24.04**	**0.01**	**0.30**	**0.01**	**0.00**	**0.00**	**0.01**	**5.30**	**7.93**	**0.91**	**0.03**	**0.00**	**100.75**
Std Dev	**1.02**	**0.01**	**0.61**	**0.00**	**0.09**	**0.01**	**0.00**	**0.00**	**0.01**	**0.82**	**0.44**	**0.09**	**0.04**	**0.00**	**0.28**
8 Oxygen Basis (sum excludes F&Cl)															
EB17-Pl-1	2.79	0.00	1.21	0.00	0.01	0.00	0.00	0.00	0.00	0.21	0.72	0.05	0.00	0.00	4.99
EB17-Pl-2	2.71	0.00	1.28	0.00	0.01	0.00	0.00	0.00	0.00	0.29	0.65	0.05	0.00	0.00	4.99
EB17-Pl-3	2.74	0.00	1.26	0.00	0.01	0.00	0.00	0.00	0.00	0.26	0.66	0.06	0.01	0.00	4.99
Average	**2.75**	**0.00**	**1.25**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.25**	**0.68**	**0.05**	**0.00**	**0.00**	**4.99**
Std Dev	**0.04**	**0.00**	**0.03**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.04**	**0.01**	**0.01**	**0.00**	**0.00**

APPENDIX B:

Electron Microprobe Mineral Chemistry

Zeolites

Zeolites															
	Weight Percent Components														
Label	SiO_2	TiO_2	Al_2O_3	Cr_2O_3	FeO*	MnO	MgO	NiO	ZnO	CaO	Na_2O	K_2O	F	Cl	Total
	Cations														
	Si	Ti	Al	Cr	Fe	Mn	Mg	Ni	Zn	Ca	Na	K	F	Cl	Sum
MR-Bentonite															
zeoltilized shards															
MRBENT-Shard1	69.70	0.02	12.93	0.02	0.09	0.00	0.10	0.01	0.00	0.53	5.70	0.21	0.00	0.00	89.30
MRBENT-Shard2	69.87	0.00	12.37	0.00	0.07	0.01	0.10	0.02	0.00	0.58	5.99	0.37	0.00	0.00	89.39
MRBENT-Shard3	70.79	0.02	12.20	0.01	0.08	0.00	0.11	0.00	0.00	0.56	5.62	0.22	0.10	0.00	89.71
MRBENT-F2Sh4	69.54	0.00	12.10	0.00	0.08	0.01	0.86	0.00	0.00	1.64	2.58	0.42	0.01	0.00	87.24
MRBENT-F2Sh5	68.75	0.00	12.48	0.00	0.06	0.00	0.93	0.00	0.00	1.74	3.45	0.22	0.00	0.01	87.65
MRBENT-F2Sh6	70.78	0.00	12.55	0.01	0.06	0.00	0.31	0.00	0.01	1.96	2.80	0.21	0.07	0.01	88.78
MRBENT-F3Sh7	73.87	0.01	12.87	0.03	0.10	0.00	0.07	0.00	0.00	0.54	4.70	0.05	0.00	0.00	92.24
MRBENT-F3-Sh8	73.22	0.00	12.93	0.00	0.09	0.01	0.11	0.02	0.01	0.55	5.56	0.06	0.00	0.00	92.55
MRBENT-F3Sh9	74.98	0.00	12.93	0.01	0.14	0.02	0.13	0.00	0.03	0.45	4.72	0.06	0.00	0.01	93.47
Average	**71.28**	**0.01**	**12.60**	**0.01**	**0.09**	**0.00**	**0.30**	**0.01**	**0.01**	**0.95**	**4.57**	**0.20**	**0.02**	**0.00**	**90.04**
Std Dev	**2.19**	**0.01**	**0.33**	**0.01**	**0.02**	**0.01**	**0.34**	**0.01**	**0.01**	**0.63**	**1.31**	**0.13**	**0.04**	**0.00**	**2.21**
6 Oxygen Basis															
MRBENT-Shard1	2.48	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.39	0.01	0.00	0.00	3.45
MRBENT-Shard2	2.49	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.41	0.02	0.00	0.00	3.47
MRBENT-Shard3	2.51	0.00	0.51	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.39	0.01	0.01	0.00	3.45
MRBENT-F2Sh4	2.51	0.00	0.51	0.00	0.00	0.00	0.05	0.00	0.00	0.06	0.18	0.02	0.00	0.00	3.34
MRBENT-F2Sh5	2.48	0.00	0.53	0.00	0.00	0.00	0.05	0.00	0.00	0.07	0.24	0.01	0.00	0.00	3.38
MRBENT-F2Sh6	2.51	0.00	0.52	0.00	0.00	0.00	0.02	0.00	0.00	0.07	0.19	0.01	0.01	0.00	3.34
MRBENT-F3Sh7	2.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.31	0.00	0.00	0.00	3.38
MRBENT-F3-Sh8	2.50	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.37	0.00	0.00	0.00	3.42
MRBENT-F3Sh9	2.52	0.00	0.51	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.31	0.00	0.00	0.00	3.38
Average	**2.50**	**0.00**	**0.52**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.04**	**0.31**	**0.01**	**0.00**	**0.00**	**3.40**
Std Dev	**0.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.02**	**0.00**	**0.00**	**0.02**	**0.09**	**0.01**	**0.00**	**0.00**	**0.05**
EBS-1															
zeoltilized shards															
EBS1-F1-Sh1	73.23	0.01	12.37	0.01	0.10	0.00	0.15	0.00	0.00	1.30	4.40	1.06	0.01	0.01	92.65
EBS1-F1-Sh2	70.17	0.00	12.55	0.00	0.05	0.00	0.17	0.01	0.00	1.35	4.23	1.08	0.04	0.01	89.67
EBS1-F1-Sh3	70.10	0.00	12.91	0.00	0.06	0.00	0.15	0.00	0.00	1.72	3.58	1.09	0.00	0.00	89.61
EBS1-F2-Sh4	71.52	0.03	13.24	0.00	0.07	0.01	0.13	0.02	0.01	1.97	3.86	0.91	0.00	0.01	91.79
EBS1-F2-Sh5	70.68	0.01	13.29	0.00	0.08	0.00	0.14	0.00	0.00	2.05	4.30	0.92	0.00	0.00	91.47
EBS1-F2-Sh6	71.13	0.00	12.79	0.00	0.20	0.01	0.13	0.00	0.00	1.34	4.29	1.18	0.00	0.01	91.08
EBS1-F3-Sh7	71.23	0.00	12.49	0.00	0.07	0.00	0.10	0.00	0.01	1.59	3.84	1.53	0.00	0.00	90.87
EBS1-F3-Sh8	71.23	0.00	12.97	0.00	0.15	0.00	0.21	0.02	0.00	1.27	3.66	1.78	0.04	0.00	91.33
EBS1-F3-Sh9	71.99	0.00	12.96	0.00	0.05	0.00	0.13	0.03	0.00	1.96	3.38	1.44	0.09	0.00	92.03
EBS1-F3-Sh10	70.06	0.00	13.11	0.01	0.06	0.01	0.13	0.00	0.00	1.71	3.44	1.58	0.00	0.00	90.10

Average	**71.13**	**0.01**	**12.87**	**0.00**	**0.09**	**0.00**	**0.14**	**0.01**	**0.00**	**1.63**	**3.90**	**1.26**	**0.02**	**0.00**	**91.06**
Std Dev	**0.98**	**0.01**	**0.32**	**0.00**	**0.05**	**0.00**	**0.03**	**0.01**	**0.01**	**0.30**	**0.38**	**0.30**	**0.03**	**0.00**	**1.01**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
6 Oxygen Basis															
EBS1-F1-Sh1	2.51	0.00	0.50	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.29	0.05	0.00	0.00	3.41
EBS1-F1-Sh2	2.49	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.29	0.05	0.00	0.00	3.42
EBS1-F1-Sh3	2.48	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.25	0.05	0.00	0.00	3.39
EBS1-F2-Sh4	2.48	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.26	0.04	0.00	0.00	3.40
EBS1-F2-Sh5	2.46	0.00	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.29	0.04	0.00	0.00	3.43
EBS1-F2-Sh6	2.49	0.00	0.53	0.00	0.01	0.00	0.01	0.00	0.00	0.05	0.29	0.05	0.00	0.00	3.42
EBS1-F3-Sh7	2.50	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.26	0.07	0.00	0.00	3.41
EBS1-F3-Sh8	2.49	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.25	0.08	0.00	0.00	3.42
EBS1-F3-Sh9	2.49	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.23	0.06	0.01	0.00	3.40
EBS1-F3-Sh10	2.48	0.00	0.55	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.24	0.07	0.00	0.00	3.40
Average	**2.49**	**0.00**	**0.53**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.06**	**0.26**	**0.06**	**0.00**	**0.00**	**3.41**
Std Dev	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.01**	**0.00**	**0.00**	**0.01**
EBS-2															
zeoltilized shards															
EBS2-F1-Sh1	72.20	0.00	12.39	0.00	0.08	0.01	0.12	0.00	0.01	1.63	3.57	1.02	0.11	0.01	91.15
EBS2-F1-Sh2	70.52	0.00	12.90	0.00	0.09	0.01	0.13	0.00	0.01	1.68	3.31	0.96	0.17	0.00	89.76
EBS2-F1-Sh3	72.31	0.01	12.32	0.00	0.05	0.00	0.14	0.00	0.01	1.66	3.88	0.98	0.00	0.00	91.35
EBS2-F2-Sh4	72.50	0.00	11.99	0.00	0.11	0.00	0.11	0.00	0.01	1.76	3.10	0.91	0.00	0.01	90.50
EBS2-F2-Sh5	71.73	0.03	12.09	0.02	0.07	0.00	0.12	0.00	0.01	1.69	4.06	1.24	0.02	0.00	91.07
EBS2-F2-Sh6	70.28	0.02	12.69	0.00	0.07	0.00	0.13	0.00	0.00	1.83	4.22	1.04	0.02	0.00	90.30
EBS2-F3-Sh7	71.85	0.00	12.81	0.00	0.08	0.01	0.11	0.01	0.01	2.12	3.81	1.00	0.12	0.01	91.94
EBS2-F3-Sh8	70.52	0.00	12.67	0.00	0.10	0.00	0.11	0.00	0.00	2.02	3.38	1.12	0.19	0.01	90.12
EBS2-F3-Sh9	69.81	0.00	12.33	0.02	0.37	0.00	0.17	0.00	0.01	0.87	4.01	1.30	0.00	0.03	88.93
Average	**71.30**	**0.01**	**12.47**	**0.00**	**0.11**	**0.00**	**0.13**	**0.00**	**0.01**	**1.69**	**3.70**	**1.06**	**0.07**	**0.01**	**90.57**
Std Dev	**1.01**	**0.01**	**0.32**	**0.01**	**0.10**	**0.00**	**0.02**	**0.00**	**0.01**	**0.35**	**0.38**	**0.13**	**0.08**	**0.01**	**0.92**
6 Oxygen Basis															
EBS2-F1-Sh1	2.51	0.00	0.51	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.24	0.05	0.01	0.00	3.39
EBS2-F1-Sh2	2.50	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.23	0.04	0.02	0.00	3.40
EBS2-F1-Sh3	2.51	0.00	0.50	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.26	0.04	0.00	0.00	3.39

EBS2-F2-Sh4	2.53	0.00	0.49	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.21	0.04	0.00	0.00	3.35
EBS2-F2-Sh5	2.51	0.00	0.50	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.27	0.06	0.00	0.00	3.41
EBS2-F2-Sh6	2.48	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.29	0.05	0.00	0.00	3.43
EBS2-F3-Sh7	2.49	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.26	0.04	0.01	0.00	3.42
EBS2-F3-Sh8	2.50	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.23	0.05	0.02	0.00	3.41
EBS2-F3-Sh9	2.50	0.00	0.52	0.00	0.01	0.00	0.01	0.00	0.00	0.03	0.28	0.06	0.00	0.00	3.41
Average	**2.50**	**0.00**	**0.52**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.06**	**0.25**	**0.05**	**0.01**	**0.00**	**3.40**
Std Dev	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.01**	**0.01**	**0.00**	**0.02**
EBS-4															

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS4-Cpt1-1	69.54	0.06	14.91	0.02	2.68	0.00	0.85	0.00	0.00	0.68	1.60	0.84	0.00	0.04	91.21
EBS4-Cpt2-1	74.50	0.00	13.08	0.00	0.16	0.00	0.13	0.00	0.00	1.55	0.32	0.48	0.00	0.01	90.24
AVERAGE	72.02	0.03	13.99	0.01	1.42	0.00	0.49	0.00	0.00	1.12	0.96	0.66	0.00	0.03	90.73
St Dev	2.48	0.03	0.92	0.01	1.26	0.00	0.36	0.00	0.00	0.44	0.64	0.18	0.00	0.01	0.49
24 oxygen Atoms per Formula Unit (sum excludes F & Cl)															
EBS4-Cpt1-1	9.71	0.01	2.45	0.00	0.31	0.00	0.18	0.00	0.00	0.10	0.43	0.15	0.00	0.01	13.35
EBS4-Cpt2-1	10.23	0.00	2.12	0.00	0.02	0.00	0.03	0.00	0.00	0.23	0.09	0.08	0.00	0.00	12.79
AVERAGE	9.97	0.00	2.29	0.00	0.17	0.00	0.10	0.00	0.00	0.17	0.26	0.12	0.00	0.01	13.07
St Dev	0.26	0.00	0.17	0.00	0.15	0.00	0.08	0.00	0.00	0.06	0.17	0.03	0.00	0.00	0.28
EBS-5															
zeoltilized shards															
EBS5-F1-Sh1	74.57	0.03	11.88	0.00	0.11	0.01	0.11	0.00	0.00	1.46	2.44	0.06	0.00	0.01	90.69
EBS5-F1-Sh2	71.46	0.00	15.91	0.00	0.09	0.01	0.00	0.02	0.04	0.59	3.21	8.03	0.00	0.01	99.37
Average	**73.01**	**0.01**	**13.90**	**0.00**	**0.10**	**0.01**	**0.06**	**0.01**	**0.02**	**1.03**	**2.83**	**4.05**	**0.00**	**0.01**	**95.03**
Std Dev	**2.20**	**0.02**	**2.85**	**0.00**	**0.01**	**0.00**	**0.08**	**0.01**	**0.03**	**0.61**	**0.54**	**5.64**	**0.00**	**0.00**	**6.14**
6 Oxygen Basis															
EBS5-F1-Sh1	2.57	0.00	0.48	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.16	0.00	0.00	0.00	3.28
EBS5-F1-Sh2	2.38	0.00	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.21	0.34	0.00	0.00	3.58
Average	**2.47**	**0.00**	**0.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.19**	**0.17**	**0.00**	**0.00**	**3.43**
Std Dev	**0.13**	**0.00**	**0.10**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**0.24**	**0.00**	**0.00**	**0.22**
Analcime/New Zeolite															

EBS5-F1-An1	71.70	0.00	19.14	0.00	0.24	0.01	0.08	0.00	0.02	1.60	4.32	0.07	0.05	0.01	97.21
EBS5-F1-An2	69.73	0.00	19.44	0.00	0.12	0.02	0.04	0.00	0.00	2.05	3.98	0.04	0.13	0.01	95.50
EBS5-F1-An3	70.24	0.00	19.34	0.00	0.13	0.01	0.04	0.00	0.00	1.72	4.67	0.03	0.06	0.01	96.23
EBS5-F1-An4	70.27	0.01	19.28	0.00	0.17	0.00	0.07	0.00	0.00	1.83	4.35	0.04	0.12	0.01	96.10
EBS5-F2-Anl5	69.08	0.00	19.81	0.02	0.23	0.01	0.05	0.02	0.01	1.85	4.30	0.03	0.04	0.02	95.44
EBS5-F2-Anl6	69.92	0.01	19.35	0.00	0.18	0.01	0.05	0.00	0.00	1.91	4.62	0.03	0.04	0.02	96.11
EBS5-F2-Anl7	70.09	0.00	19.35	0.01	0.20	0.02	0.08	0.00	0.00	1.81	4.67	0.04	0.05	0.01	96.31
EBS5-F2-Anl8	69.91	0.01	18.95	0.02	0.16	0.01	0.04	0.00	0.00	1.87	4.69	0.02	0.03	0.01	95.70
EBS5-F3-Anl9	69.74	0.01	18.96	0.00	0.11	0.00	0.02	0.01	0.00	2.13	4.54	0.07	0.08	0.01	95.64
EBS5-F3-Anl10	68.88	0.00	19.33	0.01	0.13	0.00	0.03	0.00	0.00	2.16	4.56	0.06	0.07	0.08	95.25
Average	**69.96**	**0.00**	**19.29**	**0.01**	**0.17**	**0.01**	**0.05**	**0.00**	**0.00**	**1.89**	**4.47**	**0.04**	**0.07**	**0.02**	**95.95**
Std Dev	**0.76**	**0.01**	**0.25**	**0.01**	**0.04**	**0.01**	**0.02**	**0.01**	**0.01**	**0.18**	**0.23**	**0.02**	**0.04**	**0.02**	**0.57**
6 Oxygen Basis															
EBS5-F1-An1	2.35	0.00	0.74	0.00	0.01	0.00	0.00	0.00	0.00	0.06	0.27	0.00	0.01	0.00	3.43
EBS5-F1-An2	2.33	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.26	0.00	0.01	0.00	3.44
EBS5-F1-An3	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.30	0.00	0.01	0.00	3.46
EBS5-F1-An4	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.28	0.00	0.01	0.00	3.45

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS5-F2-Anl5	2.31	0.00	0.78	0.00	0.01	0.00	0.00	0.00	0.00	0.07	0.28	0.00	0.00	0.00	3.45
EBS5-F2-Anl6	2.32	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.30	0.00	0.00	0.00	3.46
EBS5-F2-Anl7	2.32	0.00	0.76	0.00	0.01	0.00	0.00	0.00	0.00	0.06	0.30	0.00	0.01	0.00	3.46
EBS5-F2-Anl8	2.33	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.30	0.00	0.00	0.00	3.45
EBS5-F3-Anl9	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.29	0.00	0.01	0.00	3.46
EBS5-F3-Anl10	2.31	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.30	0.00	0.01	0.00	3.47
Average	**2.32**	**0.00**	**0.76**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.07**	**0.29**	**0.00**	**0.01**	**0.00**	**3.45**
Std Dev	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.01**
EBS-6															
zeoltilized shards															
EBS6-F1Sh1	69.51	0.00	12.66	0.00	0.09	0.01	0.18	0.01	0.01	2.82	3.14	0.02	0.00	0.01	88.43
EBS6-F1Sh2	69.80	0.00	12.32	0.00	0.08	0.01	0.16	0.00	0.01	2.52	3.06	0.01	0.00	0.01	87.98
EBS6-F1Sh3	70.74	0.01	13.00	0.01	0.07	0.03	0.17	0.00	0.00	2.42	3.28	0.02	0.13	0.00	89.89
EBS6-F2-Sh4(fine)	74.58	0.00	12.20	0.00	0.10	0.01	0.18	0.00	0.00	1.95	3.47	0.02	0.09	0.01	92.60
EBS6-F2-Sh5	73.53	0.00	12.50	0.01	0.09	0.03	0.16	0.00	0.01	1.98	3.29	0.02	0.00	0.00	91.61
EBS6-F2-Sh6	71.57	0.03	11.92	0.00	0.08	0.00	0.15	0.01	0.03	1.93	3.57	0.01	0.04	0.00	89.34
EBS6-F3-Sh7	70.60	0.04	11.48	0.02	0.07	0.01	0.15	0.01	0.00	1.81	4.00	0.01	0.03	0.01	88.23
EBS6-F3-Sh8	76.41	0.05	13.41	0.01	0.21	0.00	0.00	0.00	0.01	0.68	3.34	5.99	0.00	0.01	100.12
EBS6-F3-Sh8-2	76.73	0.13	13.92	0.00	0.34	0.00	0.00	0.01	0.00	1.22	4.05	4.50	0.08	0.01	100.98

EBS6-F3-Sh9	72.34	0.00	12.94	0.00	0.12	0.01	0.18	0.00	0.00	1.92	2.47	0.01	0.00	0.02	90.02
EBS6-F3-Sh10	72.19	0.00	12.69	0.01	0.10	0.00	0.17	0.00	0.00	2.19	2.88	0.00	0.00	0.01	90.23
Average	**72.55**	**0.02**	**12.64**	**0.01**	**0.12**	**0.01**	**0.14**	**0.00**	**0.01**	**1.95**	**3.32**	**0.97**	**0.03**	**0.01**	**91.77**
Std Dev	**2.50**	**0.04**	**0.68**	**0.01**	**0.08**	**0.01**	**0.07**	**0.00**	**0.01**	**0.59**	**0.46**	**2.14**	**0.05**	**0.00**	**4.56**
6 Oxygen Basis															
EBS6-F1Sh1	2.49	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.11	0.22	0.00	0.00	0.00	3.36
EBS6-F1Sh2	2.50	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.10	0.21	0.00	0.00	0.00	3.34
EBS6-F1Sh3	2.49	0.00	0.54	0.00	0.00	0.00	0.01	0.00	0.00	0.09	0.22	0.00	0.01	0.00	3.37
EBS6-F2-Sh4(fine)	2.54	0.00	0.49	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.23	0.00	0.01	0.00	3.35
EBS6-F2-Sh5	2.52	0.00	0.51	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.22	0.00	0.00	0.00	3.33
EBS6-F2-Sh6	2.53	0.00	0.50	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.24	0.00	0.00	0.00	3.35
EBS6-F3-Sh7	2.53	0.00	0.48	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.28	0.00	0.00	0.00	3.37
EBS6-F3-Sh8	2.48	0.00	0.51	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.21	0.25	0.00	0.00	3.49
EBS6-F3-Sh8-2	2.47	0.00	0.53	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.25	0.18	0.01	0.00	3.50
EBS6-F3-Sh9	2.52	0.00	0.53	0.00	0.00	0.00	0.01	0.00	0.00	0.07	0.17	0.00	0.00	0.00	3.30
EBS6-F3-Sh10	2.51	0.00	0.52	0.00	0.00	0.00	0.01	0.00	0.00	0.08	0.19	0.00	0.00	0.00	3.32
Average	**2.51**	**0.00**	**0.51**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.00**	**0.07**	**0.22**	**0.04**	**0.00**	**0.00**	**3.37**
Std Dev	**0.02**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.03**	**0.09**	**0.01**	**0.00**	**0.06**
EBS-7															
Clinoptilolite															
EBS7-Cpt1-1	59.65	0.11	15.71	0.00	3.52	0.03	1.58	0.02	0.01	4.26	1.54	0.17	0.13	0.03	86.74

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
24 oxygen Atoms per Formula Unit (sum excludes F & Cl)															
EBS7-Cpt1-1	9.03	0.01	2.80	0.00	0.45	0.00	0.36	0.00	0.00	0.69	0.45	0.03	0.06	0.01	13.831
EBS-9															
EBS9-Cpt1-1	70.04	0.05	15.11	0.00	0.99	0.01	0.57	0.00	0.01	1.94	1.11	0.31	0.00	0.03	90.17
24 oxygen Atoms per Formula Unit (sum excludes F & Cl)															
EBS9-Cpt1-1	9.78	0.00	2.49	0.00	0.12	0.00	0.12	0.00	0.00	0.29	0.30	0.05	0.00	0.01	13.15
EBS-10															
Analcime															

EBS10-Anl1-1	69.67	0.00	19.12	0.00	0.18	0.00	0.03	0.02	0.00	1.53	4.44	0.06	0.00	0.00	95.05
EBS10-Anl-2	69.83	0.03	18.98	0.00	0.21	0.01	0.05	0.01	0.02	1.13	4.04	0.02	0.03	0.00	94.36
EBS10-Anl-3	69.08	0.01	18.98	0.01	0.23	0.02	0.10	0.00	0.00	1.37	4.37	0.06	0.00	0.00	94.22
EBS10-Anl-4	68.65	0.01	18.89	0.00	0.18	0.03	0.04	0.00	0.01	1.14	5.29	0.01	0.09	0.00	94.32
EBS10-Anl-5	69.37	0.00	18.92	0.00	0.23	0.00	0.05	0.00	0.00	1.15	3.17	0.01	0.00	0.00	92.91
EBS10-Anl-6	68.03	0.01	18.72	0.00	0.16	0.01	0.02	0.01	0.00	1.64	4.07	0.03	0.00	0.01	92.71
EBS10-Anl-7	69.74	0.00	18.54	0.00	0.16	0.00	0.04	0.00	0.00	1.44	4.56	0.02	0.08	0.02	94.62
EBS10-Anl-8	69.81	0.01	19.96	0.00	0.20	0.00	0.05	0.01	0.00	1.06	3.57	0.02	0.00	0.01	94.69
EBS10-Anl-9	70.03	0.00	19.77	0.00	0.20	0.00	0.04	0.00	0.00	1.35	4.04	0.02	0.12	0.00	95.57
EBS10-Anl-10	71.44	0.13	19.86	0.00	0.60	0.02	0.22	0.01	0.01	0.88	4.42	0.20	0.03	0.01	97.84
EBS10-Anl-11	68.93	0.00	18.98	0.00	0.20	0.00	0.04	0.00	0.00	1.55	3.58	0.05	0.00	0.01	93.34
EBS10-Anl-12	68.22	0.01	19.68	0.00	0.24	0.01	0.09	0.02	0.02	0.96	3.27	0.01	0.00	0.02	92.54
EBS10-Anl-13	68.49	0.00	19.52	0.01	0.14	0.01	0.04	0.00	0.00	1.43	3.72	0.05	0.17	0.00	93.58
Average	**69.33**	**0.01**	**19.23**	**0.00**	**0.23**	**0.01**	**0.06**	**0.01**	**0.00**	**1.28**	**4.04**	**0.04**	**0.04**	**0.01**	**94.29**
Std	**0.88**	**0.03**	**0.45**	**0.00**	**0.11**	**0.01**	**0.05**	**0.01**	**0.01**	**0.23**	**0.56**	**0.05**	**0.06**	**0.01**	**1.36**
6 Oxygen Basis															
EBS10-Anl1-1	2.33	0.00	0.75	0.00	0.01	0.00	0.00	0.00	0.00	0.06	0.29	0.00	0.00	0.00	3.44
EBS10-Anl-2	2.35	0.00	0.75	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.26	0.00	0.00	0.00	3.41
EBS10-Anl-3	2.33	0.00	0.75	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.29	0.00	0.00	0.00	3.44
EBS10-Anl-4	2.33	0.00	0.75	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.35	0.00	0.01	0.00	3.48
EBS10-Anl-5	2.35	0.00	0.76	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.21	0.00	0.00	0.00	3.37
EBS10-Anl-6	2.33	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.27	0.00	0.00	0.00	3.43
EBS10-Anl-7	2.35	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.30	0.00	0.01	0.00	3.44
EBS10-Anl-8	2.33	0.00	0.79	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.23	0.00	0.00	0.00	3.39
EBS10-Anl-9	2.33	0.00	0.77	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.26	0.00	0.01	0.00	3.42
EBS10-Anl-10	2.33	0.00	0.76	0.00	0.02	0.00	0.01	0.00	0.00	0.03	0.28	0.01	0.00	0.00	3.44
EBS10-Anl-11	2.34	0.00	0.76	0.00	0.01	0.00	0.00	0.00	0.00	0.06	0.24	0.00	0.00	0.00	3.40
EBS10-Anl-12	2.33	0.00	0.79	0.00	0.01	0.00	0.00	0.00	0.00	0.04	0.22	0.00	0.00	0.00	3.39
EBS10-Anl-13	2.33	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.25	0.00	0.02	0.00	3.41
Average	**2.33**	**0.00**	**0.76**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.26**	**0.00**	**0.00**	**0.00**	**3.42**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Std	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.04**	**0.00**	**0.01**	**0.00**	**0.03**
EBS-11															
Analcime: analyzed with 2 um spot size															
EBS11-Anl-1	68.03	0.02	18.52	0.00	0.14	0.00	0.04	0.00	0.01	1.37	4.68	0.04	0.00	0.01	92.85

EBS11-Anl-2	68.06	0.00	18.23	0.02	0.12	0.02	0.04	0.00	0.00	1.34	4.46	0.05	0.00	0.02	92.36
EBS11-Anl-3	68.82	0.00	18.44	0.00	0.16	0.01	0.04	0.00	0.01	1.52	4.49	0.09	0.00	0.00	93.60
EBS11-Anl-4	69.10	0.02	18.79	0.01	0.17	0.00	0.04	0.00	0.00	1.38	3.79	0.04	0.00	0.02	93.36
EBS11-Anl-5	69.10	0.02	18.33	0.00	0.19	0.00	0.06	0.01	0.02	1.33	3.72	0.04	0.05	0.02	92.89
EBS11-Anl-6	70.07	0.03	18.50	0.00	0.17	0.01	0.04	0.01	0.02	1.53	4.28	0.08	0.00	0.01	94.74
EBS11-Anl-7	69.71	0.00	18.86	0.00	0.18	0.01	0.04	0.01	0.02	1.33	4.29	0.04	0.09	0.01	94.60
EBS11-Anl-10	70.21	0.00	18.40	0.00	0.15	0.00	0.02	0.01	0.00	1.55	3.77	0.08	0.00	0.00	94.21
EBS11-Anl-11	68.95	0.04	19.53	0.00	0.43	0.00	0.23	0.00	0.00	0.81	3.74	0.08	0.01	0.02	93.85
EBS11-Anl-12	65.72	0.05	18.23	0.00	0.65	0.00	0.25	0.00	0.03	0.88	3.09	0.09	0.00	0.04	89.02
EBS11-Anl-13	67.06	0.07	19.47	0.00	0.47	0.01	0.26	0.00	0.02	0.93	3.79	0.13	0.07	0.01	92.29
Average	**68.62**	**0.02**	**18.66**	**0.00**	**0.26**	**0.00**	**0.10**	**0.00**	**0.01**	**1.27**	**4.01**	**0.07**	**0.02**	**0.01**	**93.07**
Std	**1.28**	**0.02**	**0.44**	**0.01**	**0.17**	**0.01**	**0.09**	**0.00**	**0.01**	**0.26**	**0.45**	**0.03**	**0.03**	**0.01**	**1.51**
6 Oxygen Basis															
EBS11-Anl-1	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.31	0.00	0.00	0.00	3.45
EBS11-Anl-2	2.34	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.30	0.00	0.00	0.00	3.44
EBS11-Anl-3	2.34	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.30	0.00	0.00	0.00	3.44
EBS11-Anl-4	2.34	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.25	0.00	0.00	0.00	3.40
EBS11-Anl-5	2.36	0.00	0.74	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.25	0.00	0.00	0.00	3.40
EBS11-Anl-6	2.35	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.28	0.00	0.00	0.00	3.43
EBS11-Anl-7	2.34	0.00	0.75	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.28	0.00	0.01	0.00	3.43
EBS11-Anl-10	2.36	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.00	0.00	0.00	3.40
EBS11-Anl-11	2.33	0.00	0.78	0.00	0.01	0.00	0.01	0.00	0.00	0.03	0.25	0.00	0.00	0.00	3.41
EBS11-Anl-12	2.34	0.00	0.76	0.00	0.02	0.00	0.01	0.00	0.00	0.03	0.21	0.00	0.00	0.00	3.39
EBS11-Anl-13	2.31	0.00	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.03	0.25	0.01	0.01	0.00	3.43
Average	**2.34**	**0.00**	**0.75**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.27**	**0.00**	**0.00**	**0.00**	**3.42**
Std	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.00**	**0.00**	**0.00**	**0.02**
Analcime: analyzed with 20 um spot size															
EBS11-Anl-8 20u	64.05	0.00	17.76	0.00	0.10	0.00	0.02	0.01	0.00	1.51	8.50	0.10	0.10	0.00	92.15
EBS11-Anl-9 20u	64.70	0.00	17.76	0.00	0.08	0.01	0.01	0.01	0.00	1.46	7.64	0.09	0.00	0.01	91.77
Average	**64.37**	**0.00**	**17.76**	**0.00**	**0.09**	**0.00**	**0.02**	**0.01**	**0.00**	**1.49**	**8.07**	**0.09**	**0.05**	**0.00**	**91.96**
Std Dev	**0.46**	**0.00**	**0.00**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.03**	**0.61**	**0.01**	**0.07**	**0.00**	**0.27**
6 Oxygen Basis															
EBS11-Anl-8 20u	2.27	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.58	0.00	0.01	0.00	3.66
EBS11-Anl-9 20u	2.28	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.52	0.00	0.00	0.00	3.61
Average	**2.28**	**0.00**	**0.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.06**	**0.55**	**0.00**	**0.01**	**0.00**	**3.63**
Std Dev	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.00**	**0.01**	**0.00**	**0.04**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**

EBS-12															
EBS12-Anl?-1	71.17	0.00	18.61	0.00	0.33	0.01	0.20	0.00	0.00	0.55	1.83	0.05	0.02	0.01	92.78
EBS12-Anl?-2	70.45	0.03	18.66	0.00	0.27	0.01	0.14	0.00	0.00	0.45	4.02	0.04	0.00	0.01	94.08
EBS12-Anl?-2	67.71	0.03	19.56	0.02	0.35	0.00	0.17	0.00	0.01	0.43	2.09	0.03	0.07	0.02	90.50
EBS12-Anl?-3	70.62	0.01	18.97	0.02	0.38	0.02	0.17	0.01	0.00	0.50	3.90	0.02	0.06	0.01	94.69
EBS12-Anl?-4	70.39	0.04	18.69	0.00	0.33	0.01	0.23	0.00	0.03	0.43	3.91	0.12	0.03	0.02	94.23
EBS12-Anl?-5	69.20	0.03	19.38	0.00	0.48	0.02	0.28	0.00	0.03	0.44	2.10	0.01	0.00	0.00	91.98
EBS12-Anl?-6	73.78	0.03	11.06	0.00	0.08	0.00	0.18	0.00	0.00	1.32	2.21	0.10	0.00	0.00	88.77
Average	**70.48**	**0.02**	**17.85**	**0.01**	**0.32**	**0.01**	**0.19**	**0.00**	**0.01**	**0.59**	**2.87**	**0.05**	**0.03**	**0.01**	**92.43**
Std	**1.72**	**0.01**	**2.79**	**0.01**	**0.11**	**0.01**	**0.04**	**0.00**	**0.01**	**0.30**	**0.94**	**0.04**	**0.03**	**0.01**	**2.02**
6 Oxygen Basis															
EBS12-Anl?-1	2.40	0.00	0.74	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.12	0.00	0.00	0.00	3.30
EBS12-Anl?-2	2.36	0.00	0.74	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.26	0.00	0.00	0.00	3.40
EBS12-Anl?-2	2.35	0.00	0.80	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.14	0.00	0.01	0.00	3.33
EBS12-Anl?-3	2.36	0.00	0.75	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.25	0.00	0.01	0.00	3.40
EBS12-Anl?-4	2.36	0.00	0.74	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.25	0.01	0.00	0.00	3.40
EBS12-Anl?-5	2.36	0.00	0.78	0.00	0.01	0.00	0.01	0.00	0.00	0.02	0.14	0.00	0.00	0.00	3.32
EBS12-Anl?-6	2.59	0.00	0.46	0.00	0.00	0.00	0.01	0.00	0.00	0.05	0.15	0.00	0.00	0.00	3.26
Average	**2.40**	**0.00**	**0.71**	**0.00**	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.02**	**0.19**	**0.00**	**0.00**	**0.00**	**3.34**
Std	**0.08**	**0.00**	**0.11**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.06**	**0.00**	**0.00**	**0.00**	**0.05**
EBS-13															
EB13-Anl1-1	69.04	0.00	19.06	0.00	0.22	0.00	0.06	0.01	0.00	0.52	5.73	0.21	0.01	0.02	94.87
EB13-Anl-2	67.99	0.00	18.24	0.00	0.13	0.01	0.01	0.02	0.00	1.85	5.18	0.06	0.00	0.01	93.49
EB13-Anl-3	68.85	0.00	18.65	0.00	0.09	0.01	0.02	0.00	0.01	1.94	5.61	0.05	0.08	0.02	95.33
EB13-Anl-4	68.67	0.01	18.85	0.00	0.09	0.00	0.01	0.00	0.00	1.94	5.44	0.07	0.00	0.00	95.08
EB13-Anl-5	68.80	0.00	19.20	0.00	0.11	0.01	0.03	0.00	0.01	1.00	5.56	0.03	0.00	0.01	94.76
EB13-Anl-6	69.48	0.02	18.54	0.02	0.10	0.01	0.03	0.01	0.02	1.86	5.76	0.07	0.00	0.00	95.92
EB13-Anl-7	68.19	0.00	18.97	0.02	0.15	0.01	0.03	0.01	0.01	2.10	5.86	0.09	0.02	0.00	95.44
EB13-Anl-8	69.79	0.01	17.85	0.00	0.27	0.01	0.09	0.00	0.01	0.65	5.97	0.19	0.00	0.03	94.88
EB13-Anl-9	69.45	0.00	18.90	0.00	0.19	0.01	0.04	0.03	0.03	0.60	6.65	0.03	0.00	0.00	95.94
EB13-Anl-10	68.21	0.02	18.50	0.00	0.17	0.02	0.02	0.00	0.00	1.80	6.01	0.07	0.00	0.00	94.83
EB13-Anl-11	68.10	0.02	18.60	0.02	0.12	0.01	0.00	0.03	0.00	1.85	5.91	0.06	0.00	0.00	94.72
EB13-Anl-12	67.81	0.01	19.11	0.01	0.16	0.00	0.03	0.00	0.00	2.11	5.33	0.09	0.04	0.01	94.69
Average	**68.70**	**0.01**	**18.70**	**0.01**	**0.15**	**0.01**	**0.03**	**0.01**	**0.01**	**1.52**	**5.75**	**0.09**	**0.01**	**0.01**	**95.00**
Std Dev	**0.65**	**0.01**	**0.39**	**0.01**	**0.06**	**0.01**	**0.02**	**0.01**	**0.01**	**0.63**	**0.38**	**0.06**	**0.02**	**0.01**	**0.65**
6 Oxygen Basis															
EB13-Anl1-1	2.32	0.00	0.76	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.37	0.01	0.00	0.00	3.49
EB13-Anl-2	2.33	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.34	0.00	0.00	0.00	3.48
EB13-Anl-3	2.32	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.37	0.00	0.01	0.00	3.50

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EB13-Anl-4	2.31	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.36	0.00	0.00	0.00	3.49
EB13-Anl-5	2.32	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.36	0.00	0.00	0.00	3.48
EB13-Anl-6	2.32	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.37	0.00	0.00	0.00	3.50
EB13-Anl-7	2.30	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.38	0.00	0.00	0.00	3.52
EB13-Anl-8	2.35	0.00	0.71	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.39	0.01	0.00	0.00	3.49
EB13-Anl-9	2.32	0.00	0.74	0.00	0.01	0.00	0.00	0.00	0.00	0.02	0.43	0.00	0.00	0.00	3.53
EB13-Anl-10	2.31	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.39	0.00	0.00	0.00	3.52
EB13-Anl-11	2.31	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.39	0.00	0.00	0.00	3.52
EB13-Anl-12	2.30	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.35	0.00	0.00	0.00	3.50
Average	**2.32**	**0.00**	**0.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.05**	**0.38**	**0.00**	**0.00**	**0.00**	**3.50**
Std Dev	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.02**	**0.00**	**0.00**	**0.00**	**0.01**
EBS-14															
Wairaikite															
EB14-Anl-0	57.60	0.01	22.39	0.00	0.10	0.02	0.00	0.00	0.00	10.64	1.66	0.07	0.00	0.01	92.48
EB14-Anl-1	57.05	0.01	21.73	0.01	0.08	0.03	0.00	0.00	0.02	10.50	1.46	0.07	0.05	0.01	90.99
EB14-Anl-2	56.05	0.01	22.01	0.00	0.12	0.01	0.00	0.00	0.01	10.76	1.36	0.05	0.00	0.01	90.39
EB14-Anl-3	57.58	0.00	22.40	0.02	0.12	0.00	0.00	0.01	0.02	10.17	1.89	0.06	0.06	0.00	92.34
EB14-Anl-4	57.45	0.02	21.70	0.01	0.10	0.01	0.00	0.01	0.00	10.57	1.48	0.06	0.00	0.01	91.42
EB14-Anl-5	56.32	0.02	21.95	0.01	0.08	0.02	0.00	0.00	0.00	10.94	1.30	0.05	0.00	0.00	90.70
EB14-Anl-6	55.41	0.00	21.94	0.00	0.07	0.00	0.00	0.01	0.00	10.47	1.74	0.05	0.06	0.00	89.77
EB14-Anl-7	57.08	0.01	21.76	0.00	0.08	0.01	0.00	0.00	0.00	10.69	1.31	0.05	0.00	0.00	90.99
EB14-Anl-8	57.78	0.00	21.52	0.01	0.10	0.00	0.00	0.00	0.00	9.73	1.96	0.08	0.00	0.00	91.18
EB14-Anl-9	57.62	0.03	21.58	0.00	0.10	0.00	0.00	0.00	0.02	10.04	1.81	0.07	0.01	0.01	91.28
EB14-Anl-10	57.84	0.02	21.48	0.00	0.11	0.00	0.00	0.01	0.01	10.24	1.67	0.06	0.04	0.00	91.47
EB14-Anl-11	59.22	0.02	21.28	0.01	0.05	0.01	0.00	0.00	0.02	10.05	1.76	0.05	0.00	0.00	92.46
EB14-Anl-12	57.32	0.03	21.90	0.00	0.08	0.00	0.00	0.00	0.01	10.34	1.61	0.05	0.02	0.01	91.38
EB14-Anl-13	57.23	0.03	21.66	0.00	0.10	0.00	0.04	0.01	0.00	10.72	1.42	0.06	0.00	0.02	91.31
EB14-Anl-14	56.18	0.00	21.89	0.01	0.11	0.00	0.00	0.00	0.01	10.83	1.40	0.06	0.00	0.01	90.51
EB14-Anl-15	56.72	0.00	21.65	0.01	0.13	0.00	0.00	0.00	0.00	10.27	1.59	0.06	0.23	0.00	90.66
EB14-Anl-16	53.71	0.00	21.21	0.01	0.06	0.00	0.00	0.02	0.00	10.45	1.36	0.07	0.00	0.01	86.90
Average	**56.95**	**0.01**	**21.77**	**0.01**	**0.09**	**0.01**	**0.00**	**0.00**	**0.01**	**10.44**	**1.57**	**0.06**	**0.03**	**0.01**	**90.96**
Std Dev	1.20	0.01	0.32	0.01	0.02	0.01	0.01	0.01	0.01	0.32	0.21	0.01	0.06	0.01	1.27
6 Oxygen Basis															
EB14-Anl-0	2.06	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.11	0.00	0.00	0.00	3.53
EB14-Anl-1	2.07	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.10	0.00	0.01	0.00	3.52
EB14-Anl-2	2.05	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.10	0.00	0.00	0.00	3.52
EB14-Anl-3	2.06	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.13	0.00	0.01	0.00	3.54
EB14-Anl-4	2.07	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.10	0.00	0.00	0.00	3.52

EB14-Anl-5	2.05	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.09	0.00	0.00	0.00	3.52
EB14-Anl-6	2.05	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.12	0.00	0.01	0.00	3.54
EB14-Anl-7	2.07	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.09	0.00	0.00	0.00	3.51
EB14-Anl-8	2.09	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.14	0.00	0.00	0.00	3.52
	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EB14-Anl-9	2.08	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.13	0.00	0.00	0.00	3.52
EB14-Anl-10	2.09	0.00	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.12	0.00	0.00	0.00	3.52
EB14-Anl-11	2.11	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.12	0.00	0.00	0.00	3.51
EB14-Anl-12	2.07	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.11	0.00	0.00	0.00	3.52
EB14-Anl-13	2.07	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.10	0.00	0.00	0.00	3.52
EB14-Anl-14	2.05	0.00	0.94	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.10	0.00	0.00	0.00	3.53
EB14-Anl-15	2.07	0.00	0.93	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.11	0.00	0.03	0.00	3.53
EB14-Anl-16	2.05	0.00	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.10	0.00	0.00	0.00	3.53
Average	**2.07**	**0.00**	**0.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.41**	**0.11**	**0.00**	**0.00**	**0.00**	**3.52**
Std Dev	**0.02**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.02**	**0.01**	**0.00**	**0.01**	**0.00**	**0.01**
EBS-15															
Analcime															
EB15-Anl-1	65.29	0.00	19.90	0.01	0.54	0.01	0.12	0.00	0.00	3.57	4.15	0.01	0.00	0.01	93.61
EB15-Anl-2	65.79	0.03	20.34	0.00	0.23	0.01	0.06	0.01	0.00	3.91	4.40	0.04	0.00	0.01	94.82
EB15-Anl-3	65.92	0.01	20.75	0.00	0.19	0.02	0.04	0.02	0.03	4.20	3.39	0.03	0.08	0.00	94.69
EB15-Anl-4	66.44	0.01	19.63	0.00	0.48	0.02	0.13	0.02	0.00	3.53	3.41	0.03	0.07	0.03	93.78
EB15-Anl-5	66.29	0.01	20.25	0.00	0.41	0.02	0.11	0.02	0.00	3.71	3.50	0.02	0.00	0.02	94.37
EB15-Anl-6	66.21	0.04	19.43	0.01	0.42	0.03	0.09	0.00	0.00	3.83	2.90	0.01	0.00	0.02	92.99
EB15-Anl-7	65.54	0.01	20.23	0.00	0.55	0.02	0.17	0.00	0.01	3.45	3.39	0.05	0.00	0.02	93.45
EB15-Anl-8	65.61	0.00	19.52	0.00	0.30	0.02	0.05	0.02	0.00	4.05	3.67	0.03	0.08	0.01	93.36
EB15-Anl-9	65.92	0.04	19.15	0.00	0.35	0.01	0.13	0.00	0.01	3.57	4.36	0.02	0.02	0.02	93.60
EB15-Anl-10	66.11	0.01	19.05	0.00	0.19	0.01	0.04	0.01	0.00	3.66	3.89	0.06	0.00	0.02	93.05
EB15-Anl-11	65.82	0.02	19.36	0.03	0.34	0.00	0.11	0.01	0.00	3.78	3.77	0.02	0.11	0.01	93.39
EB15-Anl-12	66.19	0.01	19.23	0.01	0.25	0.00	0.09	0.01	0.00	3.95	3.79	0.01	0.00	0.02	93.55
EB15-Anl-13	65.73	0.00	20.06	0.00	0.24	0.02	0.06	0.00	0.03	3.72	4.37	0.08	0.00	0.03	94.34
Average	**65.91**	**0.01**	**19.76**	**0.01**	**0.34**	**0.01**	**0.09**	**0.01**	**0.01**	**3.76**	**3.77**	**0.03**	**0.03**	**0.02**	**93.77**
Std Dev	0.33	0.01	0.53	0.01	0.13	0.01	0.04	0.01	0.01	0.22	0.46	0.02	0.04	0.01	0.60
6 Oxygen Basis															
EB15-Anl-1	2.25	0.00	0.81	0.00	0.02	0.00	0.01	0.00	0.00	0.13	0.28	0.00	0.00	0.00	3.49
EB15-Anl-2	2.24	0.00	0.82	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.29	0.00	0.00	0.00	3.50
EB15-Anl-3	2.24	0.00	0.83	0.00	0.01	0.00	0.00	0.00	0.00	0.15	0.22	0.00	0.01	0.00	3.46
EB15-Anl-4	2.28	0.00	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.13	0.23	0.00	0.01	0.00	3.45
EB15-Anl-5	2.26	0.00	0.81	0.00	0.01	0.00	0.01	0.00	0.00	0.14	0.23	0.00	0.00	0.00	3.45
EB15-Anl-6	2.28	0.00	0.79	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.19	0.00	0.00	0.00	3.42
EB15-Anl-7	2.25	0.00	0.82	0.00	0.02	0.00	0.01	0.00	0.00	0.13	0.23	0.00	0.00	0.00	3.45

EB15-Anl-8	2.26	0.00	0.79	0.00	0.01	0.00	0.00	0.00	0.00	0.15	0.25	0.00	0.01	0.00	3.47
EB15-Anl-9	2.27	0.00	0.78	0.00	0.01	0.00	0.01	0.00	0.00	0.13	0.29	0.00	0.00	0.00	3.49
EB15-Anl-10	2.28	0.00	0.77	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.26	0.00	0.00	0.00	3.46
EB15-Anl-11	2.27	0.00	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.14	0.25	0.00	0.01	0.00	3.47
EB15-Anl-12	2.27	0.00	0.78	0.00	0.01	0.00	0.00	0.00	0.00	0.15	0.25	0.00	0.00	0.00	3.46
EB15-Anl-13	2.25	0.00	0.81	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.29	0.00	0.00	0.00	3.50
Average	**2.26**	**0.00**	**0.80**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.14**	**0.25**	**0.00**	**0.00**	**0.00**	**3.47**
Std Dev	**0.01**	**0.00**	**0.02**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.03**	**0.00**	**0.00**	**0.00**	**0.02**

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
EBS-16															
Analcime															
EB16-Anl-1	68.93	0.00	18.54	0.00	0.11	0.02	0.02	0.00	0.00	1.20	4.75	0.04	0.00	0.00	93.63
EB16-Anl-2	69.87	0.02	18.68	0.00	0.16	0.00	0.04	0.00	0.02	0.63	5.49	0.02	0.00	0.01	94.95
EB16-Anl-3	69.42	0.00	18.69	0.00	0.11	0.01	0.02	0.00	0.00	1.16	5.21	0.04	0.18	0.00	94.84
EB16-Anl-4	68.37	0.00	18.63	0.01	0.11	0.00	0.01	0.01	0.00	1.39	5.25	0.05	0.00	0.00	93.84
EB16-Anl-5	69.27	0.02	18.37	0.00	0.48	0.00	0.02	0.01	0.00	1.40	5.09	0.06	0.12	0.01	94.84
EB16-Anl-6	68.67	0.01	18.71	0.02	0.11	0.00	0.02	0.00	0.00	0.63	5.73	0.02	0.00	0.00	93.92
EB16-Anl-7	68.66	0.00	18.42	0.00	0.07	0.00	0.03	0.00	0.00	0.82	5.86	0.02	0.05	0.00	93.94
EB16-Anl-8	68.25	0.00	18.86	0.00	0.15	0.03	0.04	0.00	0.01	0.63	5.39	0.04	0.05	0.01	93.45
EB16-Anl-9	69.79	0.02	18.60	0.00	0.13	0.01	0.04	0.00	0.00	0.55	5.31	0.05	0.00	0.01	94.52
EB16-Anl-10	68.17	0.01	18.34	0.00	0.09	0.03	0.01	0.00	0.00	1.47	5.03	0.07	0.04	0.00	93.27
Average	**68.94**	**0.01**	**18.58**	**0.00**	**0.15**	**0.01**	**0.03**	**0.00**	**0.00**	**0.99**	**5.31**	**0.04**	**0.05**	**0.00**	**94.12**
Std Dev	**0.62**	**0.01**	**0.17**	**0.01**	**0.12**	**0.01**	**0.01**	**0.00**	**0.01**	**0.37**	**0.33**	**0.02**	**0.06**	**0.00**	**0.62**
6 Oxygen Basis															
EB16-Anl-1	2.34	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.31	0.00	0.00	0.00	3.45
EB16-Anl-2	2.34	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.36	0.00	0.00	0.00	3.47
EB16-Anl-3	2.34	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.34	0.00	0.02	0.00	3.47
EB16-Anl-4	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.35	0.00	0.00	0.00	3.48
EB16-Anl-5	2.34	0.00	0.73	0.00	0.01	0.00	0.00	0.00	0.00	0.05	0.33	0.00	0.01	0.00	3.47
EB16-Anl-6	2.33	0.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.38	0.00	0.00	0.00	3.48
EB16-Anl-7	2.33	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.39	0.00	0.01	0.00	3.49
EB16-Anl-8	2.33	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.36	0.00	0.01	0.00	3.47
EB16-Anl-9	2.35	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.35	0.00	0.00	0.00	3.46
EB16-Anl-10	2.33	0.00	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.33	0.00	0.00	0.00	3.47
Average	**2.34**	**0.00**	**0.74**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.04**	**0.35**	**0.00**	**0.00**	**0.00**	**3.47**

Std Dev	**0.01**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.00**	**0.01**	**0.00**	**0.01**
EBS-17															
Analcime															
EB17-Anl-1	64.82	0.03	20.36	0.00	0.20	0.01	0.03	0.01	0.00	4.05	4.12	0.02	0.00	0.01	93.67
EB17-Anl-2	64.74	0.03	21.00	0.00	0.70	0.02	0.22	0.00	0.00	4.07	4.14	0.03	0.12	0.04	95.11
EB17-Anl-3	65.07	0.01	20.95	0.00	0.40	0.00	0.12	0.02	0.00	3.94	4.41	0.02	0.07	0.02	95.02
EB17-Anl-4	65.62	0.01	19.40	0.00	0.51	0.00	0.14	0.01	0.00	4.21	3.63	0.07	0.00	0.01	93.62
EB17-Anl-5	65.84	0.00	19.86	0.00	0.24	0.01	0.06	0.02	0.02	4.04	4.17	0.02	0.00	0.01	94.30
EB17-Anl-6	65.64	0.03	19.87	0.00	0.16	0.00	0.04	0.00	0.00	4.18	4.17	0.02	0.06	0.02	94.20
EB17-Anl-7	65.17	0.01	19.69	0.00	0.17	0.01	0.04	0.02	0.02	4.38	3.74	0.03	0.00	0.01	93.29
EB17-Anl-8	65.64	0.01	19.86	0.00	0.16	0.01	0.04	0.00	0.01	4.01	3.88	0.04	0.00	0.01	93.66
EB17-Anl-9	65.73	0.00	19.72	0.01	0.13	0.00	0.04	0.02	0.00	4.16	4.28	0.03	0.00	0.01	94.12
EB17-Anl-10	66.49	0.03	19.89	0.00	0.27	0.01	0.09	0.00	0.02	3.76	4.30	0.04	0.04	0.00	94.94

	Weight Percent Components														
Label	**SiO_2**	**TiO_2**	**Al_2O_3**	**Cr_2O_3**	**FeO***	**MnO**	**MgO**	**NiO**	**ZnO**	**CaO**	**Na_2O**	**K_2O**	**F**	**Cl**	**Total**
	Cations														
	Si	**Ti**	**Al**	**Cr**	**Fe**	**Mn**	**Mg**	**Ni**	**Zn**	**Ca**	**Na**	**K**	**F**	**Cl**	**Sum**
Average	**65.47**	**0.01**	**20.06**	**0.00**	**0.29**	**0.01**	**0.08**	**0.01**	**0.01**	**4.08**	**4.09**	**0.03**	**0.03**	**0.01**	**94.19**
Std Dev	**0.53**	**0.01**	**0.54**	**0.00**	**0.19**	**0.01**	**0.06**	**0.01**	**0.01**	**0.17**	**0.25**	**0.02**	**0.04**	**0.01**	**0.65**
6 Oxygen Basis															
EB17-Anl-1	2.23	0.00	0.83	0.00	0.01	0.00	0.00	0.00	0.00	0.15	0.28	0.00	0.00	0.00	3.49
EB17-Anl-2	2.21	0.00	0.85	0.00	0.02	0.00	0.01	0.00	0.00	0.15	0.27	0.00	0.01	0.00	3.51
EB17-Anl-3	2.22	0.00	0.84	0.00	0.01	0.00	0.01	0.00	0.00	0.14	0.29	0.00	0.01	0.00	3.51
EB17-Anl-4	2.26	0.00	0.79	0.00	0.01	0.00	0.01	0.00	0.00	0.16	0.24	0.00	0.00	0.00	3.47
EB17-Anl-5	2.25	0.00	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.15	0.28	0.00	0.00	0.00	3.49
EB17-Anl-6	2.25	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.28	0.00	0.01	0.00	3.49
EB17-Anl-7	2.25	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.25	0.00	0.00	0.00	3.47
EB17-Anl-8	2.25	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.26	0.00	0.00	0.00	3.47
EB17-Anl-9	2.25	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.28	0.00	0.00	0.00	3.49
EB17-Anl-10	2.26	0.00	0.80	0.00	0.01	0.00	0.00	0.00	0.00	0.14	0.28	0.00	0.00	0.00	3.49
Average	**2.24**	**0.00**	**0.81**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.15**	**0.27**	**0.00**	**0.00**	**0.00**	**3.49**
Std Dev	**0.02**	**0.00**	**0.02**	**0.00**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.02**	**0.00**	**0.00**	**0.00**	**0.01**

APPENDIX C1:

Aqueous Geochemical Data

EBS-1

Sample ID	Date Sampled	Al	As	Ba	Ca	Cl	F	Fe	K	Std. D.	Mo	Na	Std. D.	Se	Si	Std. D.	SiO2	Std. D.	SO4	Sr	Ti	Zn	TDS	Cation	Anion	Balance
		ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	+/-	calc ppm	+/-	ppm	ppm	ppm	ppm	ppm	Sum	Sum	
ESB 01/00		<0.05	<0.01	<0.05	89	1045	<0.2	<0.5	583	3	<0.05	167	2	<0.05	1	0	2	0	47	0.05	<0.05	<0.05	1934	27	30	-0.07
EBS 1/01 F	7/27/2011	0.06	0.01	0.09	33	---	---	<0.5	458	0	0.06	403	3	<0.05	46	0	98	1	---	0.25	<0.05	<0.05	992	31	0	1
EBS 1/02 F	8/1/2011	<0.05	0.03	0.10	18	---	---	<0.5	276	1	0.14	581	0	<0.05	87	1	186	2	---	0.24	<0.05	<0.05	1061	33	0	1
EBS 1/03 F	8/8/2011	<0.05	0.03	0.12	17	---	---	<0.5	207	2	0.16	687	8	<0.05	102	0	217	1	---	0.23	<0.05	0.57	1130	36	0	1
EBS 1/04 F	8/11/2011	0.39	0.04	0.10	14	---	---	<0.5	174	1	0.13	683	1	<0.05	296	2	634	5	---	0.13	0.07	0.60	1507	35	0	1
EBS 1/05 F	8/15/2011	0.15	0.04	0.09	12	---	---	1.0	155	1	0.09	690	5	<0.05	322	3	690	6		0.09	0.07	0.50	1549	35	0	1
EBS 1/06F	8/24/2011	1.46	0.34	0.08	3	---	---	<0.5	98	1	<0.05	647	4	<0.05	584	1	1250	2	---	<0.05	0.11	0.52	2000	31	0	1
EBS 1/07 Q	8/23/2011	<0.05	0.02	0.02	10	1458	1.39	<0.5	37	0	<0.005	584	2	0.01	137	1	293	2	201	0.06	0.02	0.04	2585	27	45	-0.26

EBS-2

Sample ID	Date Sampled	Al	Std. D.	As	Ba	Ca	Std. D.	Cl	Cr	Cu	F	K	Std. D.	Mo	Na	Std. D.	Se	Si	Std. D.	SiO2	Std. D.	SO4	Sr	Ti	Zn	TDS	Cation	Anion	Balance
		ppm	+/-	ppm	ppm	ppm	+/-	ppm	ppm	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	ppm	ppm	ppm	Ppm	Sum	Sum	
EBS 2/01 F	7/27/2011	0.07	0.01	<0.01	0.08	39	1	---	<0.05	<0.05	---	469	7	0.07	362	4	<0.05	34	0	73	1	---	0.20	<0.05	<0.05	943	30	0	1.00
EBS 2/02 F	8/1/2011	<0.05		<0.01	0.09	18	1	---	<0.05	<0.05	---	254	4	0.16	540	7	<0.05	76	1	164	2	---	0.18	<0.05	0.35	976	31	0	1.00
EBS 2/03 F	8/8/2011	<0.05		<0.01	0.09	18	0	---	<0.05	<0.05	---	170	1	0.15	575	3	<0.05	94	1	202	3	---	0.12	<0.05	0.44	966	30	0	1.00
EBS 2/04 F	8/11/2011	0.16	0.01	<0.01	0.10	18	0	---	<0.05	<0.05	---	149	0	0.09	568	12	<0.05	274	1	586	3	---	0.09	0.07	0.68	1322	29	0	1.00
EBS 2/05 F	8/15/2011	0.12	0.01	<0.01	0.10	17	0	---	<0.05	<0.05	---	119	2	<0.05	521	2	<0.05	284	3	608	7	---	0.08	0.07	0.40	1266	27	0	1.00
EBS 2/06 F	8/22/2011	0.47	0.00	0.06	0.09	5	0	---	<0.05	<0.05	---	84	0	<0.05	452	1	<0.05	546	1	1168	2	---	<0.05	0.12	0.48	1710	22	0	1.00
EBS 2/07 Q	8/24/2011	3.50	0.05	0.01	0.02	11	0	772	0.007	0.011	1.62	44	1	<0.005	407	7	0.01	129	1	276	3	114	0.08	0.03	0.01	1629	20	24	-0.10

EBS-3

Sample ID	Date analyzed	Date Sampled	Al	As	B	Std. D.	Ba	Ca	K	Std. D.	Li	Na	Std. D.	Ni	Rb	Si	Std. D.	SiO2	Std. D.	Sr	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	+/-	ppm	ppm	Sum	Sum	
EBS 3/1 F	05/10/12	3/22/2012	0.04	0.017	0.61	0.01	0.08	12	202	3	0.21	422	4	0.04	0.05	47	0	100	1	0.15	737	24	0	1.00
EBS 3/2 F	05/10/12	3/28/2012	0.01	0.036	1.47	0.03	0.05	12	176	0	0.23	579	4	0.09	0.05	81	0	173	1	0.17	943	30	0	1.00
EBS 3/3 F	05/10/12	4/4/2012	<0.01	0.034	3.40	0.04	0.08	12	134	1	0.34	556	5	0.03	0.05	86	1	185	2	0.14	891	28	0	0.99
EBS 3/4 F	05/10/12	4/18/2012	0.46	0.005	9.02	0.07	0.05	8	93	1	0.31	545	6	0.02	0.05	265	4	566	8	0.05	1222	27	0	0.97
EBS 3/5 F	05/15/12	4/25/2012	1.0	0.006	8	0	0.09	4	58	1	0.28	430	3	0.09	0.05	481	3	1028	6	0.02	1530	20	0	0.96
EBS 3/6 F	05/14/12	4/27/2012	<0.01	<0.002	7	0	0.05	7	21	0	0.51	538	2	0.06	0.01	118	1	252	3	0.08	825	24	0	0.97

EBS-4

Sample ID	Date analyzed	Date Sampled	Al	As	B	Ba	Ca	Std. D.	Cu	Fe	K	Std. D.	Li	Mg	Mn	Na	Std. D.	Ni	Pb	Rb	Si	Std. D.	SiO2	Std. D.	Sr	Ti	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	ppm	ppm	ppm	+/-	ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	ppm	ppm	ppm	Sum	Sum	
EBS 4/1 F	05/10/12	4/6/2012	0.10	0.032	0.63	0.16	14	1	0.01	<0.5	245	2	0.06	<0.5	<0.01	581	7	0.04	<0.002	0.08	61	1	130	1	0.29	<0.05	<0.01	971	32	0	1.00
EBS 4/2 F	05/14/12	4/12/2012	0.01	0.013	0.25	0.13	14	0	<0.01	<0.5	180	1	0.11	<0.5	<0.01	651	4	0.05	<0.002	0.07	86	0	185	0	0.30	<0.05	<0.01	1029	34	0	1.00
EBS 4/3 F	05/14/12	4/19/2012	10	<0.002	1	0.20	16	1	0.02	5	145	2	0.15	3.0	0.02	689	6	0.05	0.028	0.07	128	1	275	2	0.38	0.09	<0.01	1145	36	0	1.00
EBS 4/4 F	05/15/12	4/26/2012	0.3	<0.002	9	0.10	9	1	<0.01	<0.5	116	1	0.22	<0.5	<0.01	717	7	0.05	<0.002	0.08	312	3	668	7	0.15	<0.05	<0.01	1521	35	0	0.98
EBS 4/5 F	05/14/12	5/3/2012	0.14	<0.002	8	0.08	9	0	<0.01	<0.5	113	2	0.25	<0.5	<0.01	681	5	0.05	<0.002	0.08	132	1	281	2	0.16	<0.05	<0.01	1094	33	0	0.98
EBS 4/6 F	05/15/12	5/10/2012	0.9	<0.002	9	0.05	4	0	<0.01	<0.5	88	1	0.28	<0.5	<0.01	606	10	0.05	<0.002	0.08	450	7	963	16	0.04	<0.05	0.11	1671	29	0	0.97
EBS 4/7 F	05/14/12	5/11/2012	13	<0.002	8	0.13	15	0	<0.01	10	49	1	0.57	2.6	0.07	751	10	0.02	0.009	0.03	227	5	487	11	0.36	0.11	<0.01	1337	37	0	0.98

EBS-5

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std. D.	Cl	F	K	Std. D.	Li	Na	Std .D.	NO3	NO3-N	Si	Std. D.	SiO2	Std. D.	SO4	Zn	Std. D.	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	+/-	ppm	ppm	+/-	ppm	Sum	Sum	
EBS 05/00 F	07/27/12	7/2/2012	<0.1	0.39	<0.1	100	5	---	---	645	13	<0.1	184	6	---	---	<1		<2.14		---	<0.1		930	29	0	1.00
EBS 05/00 F	08/01/12	7/2/2012	<0.1	<0.1	1.95	106	1		---	667	1	<0.1	191	3	---	---	<1		<2.14			<0.1		966	31	0	1.00
EBS 5/1 F	08/02/12	7/5/2012	<0.1	1.15	<0.1	107	1	---	---	706	7	<0.1	258	2	---	---	48	0	103	0	---	<0.1		1175	35	0	1.00
EBS 5/1 F	08/01/12	7/5/2012	<0.1	0.70	<0.1	107	2	---	---	704	4	<0.1	263	2	---	---	47	0	101	0	---	<0.1		1176	35	0	1.00
EBS 05/02 F	07/27/12	7/12/2012	<0.1	9.81	<0.1	<1		---	---	96	0	<0.1	693	2	---	---	553	0	1183	0	---	<0.1		1981	33	0	0.97
EBS 05/03 F	07/27/12	7/19/2012	<0.1	10.42	<0.1	<1		---	---	91	0	<0.1	740	1	---	---	584	0	1250	1	---	<0.1		2091	34	0	0.97
EBS 5/4 F	07/27/12	7/26/2012	<0.1	11.48	<0.1	12.6	0.1	---	---	94	0	<0.1	789	1	---	---	583	1	1248	1	---	<0.1		2155	37	1	0.97
EBS 5/5 F	08/07/12	8/2/2012	0.4	11	<0.1	11	1	---	---	15	0	0.14	483	5	---	---	318	3	681	6	---	0.11	0.01	1202	22	1	0.96
EBS 5/6 F	08/21/12	8/14/2012	0.9	7	<0.1	9	1	---	---	56	1	<0.1	582	9	---	---	506	5	1082	11	---	0.84	0.09	1738	27	0	0.98
EBS 5/7 F	08/21/12	8/15/2012	0.1	7	<0.1	19	1	1278	1.3	49	0	<0.1	776	6	53.1	12	81	1	173	1	362	0.72	0.02	2719	36	45	-0.11

No unfiltered cation sample delivered

EBS-6

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std. D.	K	Li	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Sum	Sum	
EBS 06/00 F	07/27/12	7/2/2012	<0.1	<0.1	<0.1	98	2	9	<0.1	181	3	<1		<2.14		<0.1	288	13	0	1.00
EBS 06/00 F	08/01/12	7/2/2012	<0.1	<0.1	0.92	100	2	10	<0.1	192	3	<1		<2.14		<0.1	302	14	0	1.00
EBS 6/1 F	07/27/12	7/5/2012	<0.1	2.0	<0.1	59	0	29	<0.1	258	0	13	0	27	0	<0.1	375	15	0	0.99
EBS 6/1 F	08/01/12	7/5/2012	<0.1	<0.1	<0.1	71	0	17	<0.1	302	0	20	0	43	0	<0.1	433	17	0	1.00
EBS 06/02 F	07/27/12	7/12/2012	<0.1	<0.1	<0.1	53.0	0.2	<1	<0.1	387	0	24.9	0.0	53	0	<0.1	494	19	0	1.00
EBS 06/03 F	07/27/12	7/19/2012	<0.1	5.08	<0.1	41.7	0.1	22	<0.1	518	0	43.8	0.0	94	0	<0.1	681	25	0	0.98
EBS 6/4 F	07/27/12	7/26/2012	<0.1	10.91	<0.1	16.7	0.1	12	<0.1	553	1	309	0	662	0	<0.1	1254	25	1	0.96
EBS 06/06 F	08/07/12	8/6/2012	1.5	9	<0.1	10	0	12	0.12	351	4	543	2	1161	4	0.13	1545	16	0	0.95
EBS 6/7 F	08/21/12	8/9/2012	1.6	7	<0.1	8	1	1	<0.1	239	1	414	5	885	11	0.83	1142	11	0	0.94
EBS 6/8 F	08/21/12	8/10/2012	0.1	6	<0.1	10	1	<1	<0.1	313	5	183	3	392	7	0.75	722	14	0	0.96

EBS-7

Sample ID	Date analyzed	Date Sampled	Al	B	Ca	Std. D.	Cl	K	Li	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	SO4	Sr	Zn	Std. D.	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	+/-	ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	ppm	+/-	Ppm	Sum	Sum	
EBS 0700	08/21/12	8/17/2012	<0.1	<0.1	96	1	477	<1	<0.1	153	1	2	0	5	0	46	<0.1	0.28	0.37	777	11	14	-0.11
EBS 7/1 F	08/23/12	8/22/2012	0.26	0.8	35	1	---	6	<0.1	251	3	16	0	34	0	---	0.13	0.03	0.01	327	13	0	0.99
EBS 7/2 F	02/25/13	8/30/2012	0.23	1	28	0	---	12	<0.05	357	3	33	1	70	3	---	0.12	<0.05		468	17	0	0.99
EBS 7/3 F	02/25/13	9/6/2012	0.13	2	26	1	---	11	<0.05	405	6	45	2	96	4	---	0.11	<0.05		541	19	0	0.99
EBS 7/4 F	02/25/13	9/13/2012	0.73	6	9	0	---	11	0.12	365	2	185	3	396	5	---	<0.05	<0.05		788	17	0	0.97
EBS 7/5 F	02/25/13	9/20/2012	0.60	7	7	1	---	11	0.13	375	1	244	1	523	3	---	<0.05	<0.05		923	17	0	0.96
EBS 7/6 F	02/25/13	9/27/2012	2.90	7	5	1	---	11	0.15	307	1	477	3	1021	7	---	<0.05	<0.05		1354	14	0	0.95
EBS 7/7 F	02/25/13	9/28/2012	0.16	7	8	0	---	5	0.24	381	3	244	1	522	3	---	<0.05	<0.05		924	17	0	0.96

EBS-8

Sample ID	Date analyzed	Date Sampled	Al	B	Ca	Std. D.	K	Li	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	ppm	Sum	Sum	
EBS 08/01F	08/23/12	8/23/2012	2.91	9.4	6	1	7	<0.1	258	1	461	2	986	5	<0.1	0.84	1271	12	0	0.93
EBS 08/02F	02/25/13	8/30/2012	0.64	7.6	6	0	9	0.14	259	1	350	2	750	5	<0.05	<0.05	1033	12	0	0.94
EBS 08/03F	02/25/13	9/6/2012	1.42	7.5	5	0	10	0.14	247	1	493	5	1056	11	<0.05	<0.05	1326	11	0	0.94
EBS 08/04F	02/25/13	9/13/2012	<0.05	6.8	3	0	11	0.16	231	1	43	0	91	0	<0.05	<0.05	343	10	0	0.94
EBS 08/05F	02/25/13	9/20/2012	<0.05	6.8	3	0	12	0.17	228	1	37	0	79	1	<0.05	<0.05	329	10	0	0.94
EBS 08/06F	02/25/13	9/27/2012	0.86	6.6	4	0	12	0.18	218	1	385	2	824	4	<0.05	<0.05	1066	10	0	0.94
EBS 08/07 F	02/25/13	10/4/2012	0.62	6.4	4	0	12	0.18	213	2	186	3	398	6	<0.05	<0.05	634	10	0	0.94
EBS 08/08 F	02/25/13	10/5/2012	0.47	4.7	16	1	11	0.23	200	2	336	2	719	5	0.10	<0.05	952	10	0	0.96

EBS-9

Sample ID	Date analyzed	Date Sampled	Al	B	Ca	Std. D.	K	Li	Mg	Na	Std .D.	Si	Std. D.	SiO2	Std. D.	Sr	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	+/-	ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Sum	Sum	
EBS 9/0 F	02/25/13	11/1/2012	0.25	0.4	96	2	8	<0.05	<0.5	182	1	<0.5		<1		<0.05	287	13	0	1.00
EBS 9/1 F	02/25/13	11/1/2012	0.21	0.4	15	0	6	<0.05	<0.5	356	3	18	0	38	0	0.10	415	16	0	1.00
EBS 9/2 F	02/25/13	11/8/2012	0.47	0.8	18	0	8	<0.05	<0.5	415	4	42	1	89	1	0.10	532	19	0	1.00
EBS 9/3 F	02/25/13	11/15/2012	0.14	1.7	16	0	8	0.06	<0.5	423	3	57	0	122	1	0.07	571	19	0	0.99
EBS 9/4 F	02/25/13	11/21/2012	0.62	5.4	8	0	9	0.08	<0.5	419	4	196	1	418	1	<0.05	861	19	0	0.97
EBS 9/5 F	02/25/13	11/29/2012	0.48	7.0	8	0	11	0.08	<0.5	414	2	261	3	559	6	<0.05	999	19	0	0.97
EBS 9/6 F	02/25/13	12/4/2012	2.41	6.8	5	1	11	0.10	<0.5	328	2	468	4	1002	8	<0.05	1355	15	0	0.96
EBS 9/7 F	02/25/13	12/10/2012	2.18	6.8	4	0	10	0.11	<0.5	313	2	476	5	1019	10	<0.05	1356	14	0	0.96
EBS 9/8 F	02/25/13	12/11/2012	0.81	7.1	7	1	12	0.15	0.7	386	7	451	5	965	11	<0.05	1379	18	0	0.96

EBS-10

Sample ID	Date analyzed	Date Sampled	Al	Std. D.	B	Ca	Std. D.	K	Std. D.	Li	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Ppm	Sum	Sum	
EBS10/1 F	03/05/13	1/18/2013	1.56	0.03	6	9	0	150	4	<0.05	376	13	310	13	663	28	<0.05	<0.05	1205	21	0	0.97
EBS 10/2 F	03/05/13	1/24/2013	0.91	0.01	10	7	0	53	0	0.07	451	4	481	4	1028	9	<0.05	<0.05	1550	21	0	0.96
EBS 10/3 F	03/05/13	1/31/2013	0.95	0.00	10	9	0	33	0	0.08	463	4	534	2	1143	5	<0.05	0.08	1659	22	0	0.96
EBS 10/4 F	03/05/13	2/7/2013	0.87	0.02	10	9	1	29	0	0.08	453	2	533	1	1140	1	<0.05	<0.05	1642	21	0	0.96
EBS 10/5 F	03/05/13	2/15/2013	0.88	0.01	12	9	1	33	0	0.08	442	1	539	1	1154	2	<0.05	0.25	1650	21	1	0.95
EBS 10/6 F	03/05/13	2/21/2013	0.83	0.00	10	9	0	29	0	0.09	431	2	533	2	1140	3	<0.05	<0.05	1620	20	0	0.95
EBS 10/7 F	04/21/2013	2/28/2013	1.33	0.02	8	7	1	41	1	0.30	442	6	598	4	1279	10	<0.05	<0.05	1778	21	0	0.96
EBS 10/8 F 2/28/13	04/21/2013	3/1/2013	0.40	0.00	5	23	0	27	0	0.07	355	1	324	4	692	9	0.18	<0.05	1104	17	0	0.97

EBS-11

Sample ID	Date analyzed	Date Sampled	Al	B	Std. D.	Ca	Std. D.	K	Std. D.	Li	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Ppm	Sum	Sum	
EBS 11/1 F	02/26/2013	2/1/2013	3.45	7.8	0.2	5	1	71	2	0.20	425	7	491	6	1051	14	<0.05	<0.05	1563	21	0	0.97
EBS 11/2 F	02/26/2013	2/7/2013	1.98	8.1	0.0	4	0	33	0	0.21	438	11	536	2	1146	4	<0.05	0.27	1631	20	0	0.96
EBS 11/3 F	02/26/2013	2/14/2013	1.90	8.5	0.3	4	0	30	0	0.21	425	4	506	9	1082	18	<0.05	<0.05	1552	20	0	0.96
EBS 11/4 F	02/26/2013	2/21/2013	1.88	7.8	0.1	4	1	29	0	0.21	412	3	506	3	1083	6	<0.05	0.05	1538	19	0	0.96
EBS 11/5F	04/21/2013	2/28/2013	1.57	6.9	0.1	6	1	31	0	0.24	428	4	521	5	1116	11	<0.05	<0.05	1589	20	0	0.97
EBS 11/6F	04/21/2013	3/7/2013	1.63	7.2	0.0	6	1	31	0	0.22	425	2	532	1	1138	1	<0.05	<0.05	1609	20	0	0.97
EBS 11/7 F	04/21/2013	3/14/2013	1.64	7.0	0.1	6	0	30	0	0.21	408	5	473	4	1011	9	<0.05	<0.05	1464	19	0	0.97
EBS 11/8 F 3/14/13	04/21/2013	3/15/2013	0.27	7.1	0.0	35	1	34	0	0.35	499	7	388	2	830	4	0.42	<0.05	1406	24	0	0.97

EBS-13

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std. D.	K	Std. D.	Li	Mg	Mn	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	ppm	Sum	Sum	
EBS 13/00 F	3/19/2014	9/18/2013	<0.02	<0.04	<0.02	62	1	926	3	0.04	<0.2	<0.02	234	3	<0.2		<0.4		0.08	<0.02	1222	37	0	1.00
EBS 13/01 F	3/19/2014	9/18/2013	0.18	4	0.03	2.0	0.1	281	6	0.16	0.32	<0.02	451	6	110	2	235	4	0.02	<0.02	974	27	0	0.99
EBS 13/02 F	3/19/2014	10/3/2013	<0.02	8	0.05	4.1	0.2	66	0	0.28	<0.2	<0.02	578	2	32	0	68	0	0.02	0.03	724	27	0	0.97
EBS 13/03 F	3/19/2014	10/24/2013	0.42	7	0.03	2.5	0.1	56	0	0.28	<0.2	<0.02	552	7	38	1	80	2	<0.02	0.07	698	26	0	0.97
EBS 13/04 F	3/19/2014	11/14/2013	0.45	8	<0.02	2.4	0.2	56	0	0.30	<0.2	<0.02	555	6	33	0	70	0	<0.02	<0.02	692	26	0	0.97
EBS 13/05 F	3/19/2014	12/5/2013	0.03	11	0.04	3.7	0.1	75	1	0.41	<0.2	<0.02	721	6	55	0	118	1	0.04	0.02	929	34	0	0.97
EBS 13/06 F	3/19/2014	12/18/2013	0.42	10	0.04	2.9	0.2	69	0	0.40	<0.2	<0.02	666	3	68	0	145	1	0.02	0.06	894	31	0	0.97
EBS 13/07 F	3/19/2014	1/6/2014	0.39	7	<0.02	1.8	0.0	81	1	0.59	<0.2	<0.02	638	3	78	2	166	4	0.03	<0.02	895	30	0	0.98
EBS 13/08 F	3/19/2014	2/3/2014	0.28	7	0.02	4.6	0.1	67	1	0.61	<0.2	<0.02	598	5	382	3	818	7	0.08	<0.02	1495	28	0	0.98
EBS 13/09 F	3/20/2014	2/14/2014	0.35	7	0.03	4.2	0.1	48	1	0.44	<0.2	<0.02	494	7	303	3	649	7	0.06	<0.02	1203	23	0	0.97
EBS 13/10 F	3/20/2014	2/24/2014	0.34	6	0.03	4.0	0.1	49	0	0.44	<0.2	<0.02	531	2	308	2	659	5	0.06	<0.02	1251	25	0	0.98
EBS 13/11 F	3/20/2014	3/13/2014	0.05	6	0.06	3.9	0.2	44	0	0.44	<0.2	0.02	504	5	191	1	409	3	0.08	<0.02	967	23	0	0.98
EBS 13/12 F	3/20/2014	3/20/2014	0.04	6	0.07	3.6	0.2	46	0	0.47	<0.2	0.02	510	0	179	1	383	3	0.08	<0.02	949	24	0	0.98
EBS 13/13 F	7/24/2014	3/26/2014	1.03	7	0.27	<0.1		37	0	0.27	<0.1	<0.01	472	7	150	3	321	6	0.13	0.12	839	22	0	0.97

EBS-14

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std. D.	K	Std. D.	Li	Mg	Std. D.	Mn	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	+/-	ppm	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Ppm	Sum	Sum	
EBS 14/00 F	3/20/2014	11/27/2013	<0.05	0.2	<0.05	441	4	223	2	<0.05	193	3	<0.05	3781	17	1	0	1	0	0.17	<0.05	4640	207	0	1.00
EBS 14/01 F	3/20/2014	11/27/2013	<0.05	5	0.21	319	3	176	0	2	8	0	0.09	3835	11	36	0	78	0	2.5	0.11	4426	187	0	1.00
EBS 14/02 F	3/20/2014	12/6/2013	<0.05	6	0.12	507	7	106	1	6	1	0	0.16	3581	36	41	1	87	1	1.5	0.06	4296	184	0	1.00
EBS 14/03 F	3/20/2014	12/18/2013	<0.05	6	0.23	573	5	225	4	11	1	0	0.22	4056	19	51	1	108	2	2.4	0.08	4984	212	0	1.00
EBS 14/04 F	3/20/2014	1/6/2014	<0.05	6	0.29	590	17	334	6	13	1.3	0.1	0.24	4065	28	47	1	100	3	2.8	0.15	5113	216	0	1.00
EBS 14/05 F (Quench)	7/24/2014	1/8/2014	1.28	7	0.27	1084	16	172	1	6	<0.5		<0.05	3371	30	27	1	57	1	4.5	0.58	4703	205	0	1.00

EBS-15

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std .D.	Fe	K	Std .D.	Li	Mg	Std .D.	Na	Std .D.	Si	Std .D.	SiO2	Std. D.	Sr	Zn	Std. D.	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	+/-	Ppm	Sum	Sum	
EBS15/00 F	10/31/2014	3/13/2014	<0.05	<0.1	<0.05	432	1	<0.5	215	1	<0.05	186	1	3742	24	8	0	16	0	0.15	0.83	0.01	4592	204	0	1.00
EBS15/01 F	10/31/2014	4/10/2014	0.32	3.91	0.17	46	0	<0.5	62	1	0.60	<0.5		1847	12	36	0	78	1	0.23	0.26	0.37	2039	84	0	1.00
EBS15/02 F	10/31/2014	4/17/2014	0.69	3.66	0.25	52	0	<0.5	61	0	0.70	<0.5		1625	2	88	1	189	2	0.25	0.54	0.02	1934	75	0	1.00
EBS15/03 F	10/31/2014	4/24/2014	0.50	3.39	0.30	56	1	<0.5	60	0	0.68	<0.5		1514	5	75	0	160	0	0.26	0.53	0.23	1796	70	0	1.00
EBS15/05 F	10/31/2014	5/1/2014	0.27	5.13	0.53	77	0	<0.5	90	0	1.44	<0.5		2206	10	38	0	81	1	0.41	0.83	0.02	2462	102	0	1.00
EBS15/06 F	10/31/2014	5/8/2014	0.28	4.75	0.40	72	1	<0.5	83	1	1.25	<0.5		1962	17	66	1	141	3	0.36	0.38	0.04	2266	91	0	1.00
EBS15/07 F	10/31/2014	5/14/2014	<0.05	5.00	0.27	435	2	3.42	78	0	1.48	0.9	0.0	2053	7	281	0	602	1	1.44	0.45	0.16	3181	113	0	1.00

EBS-16

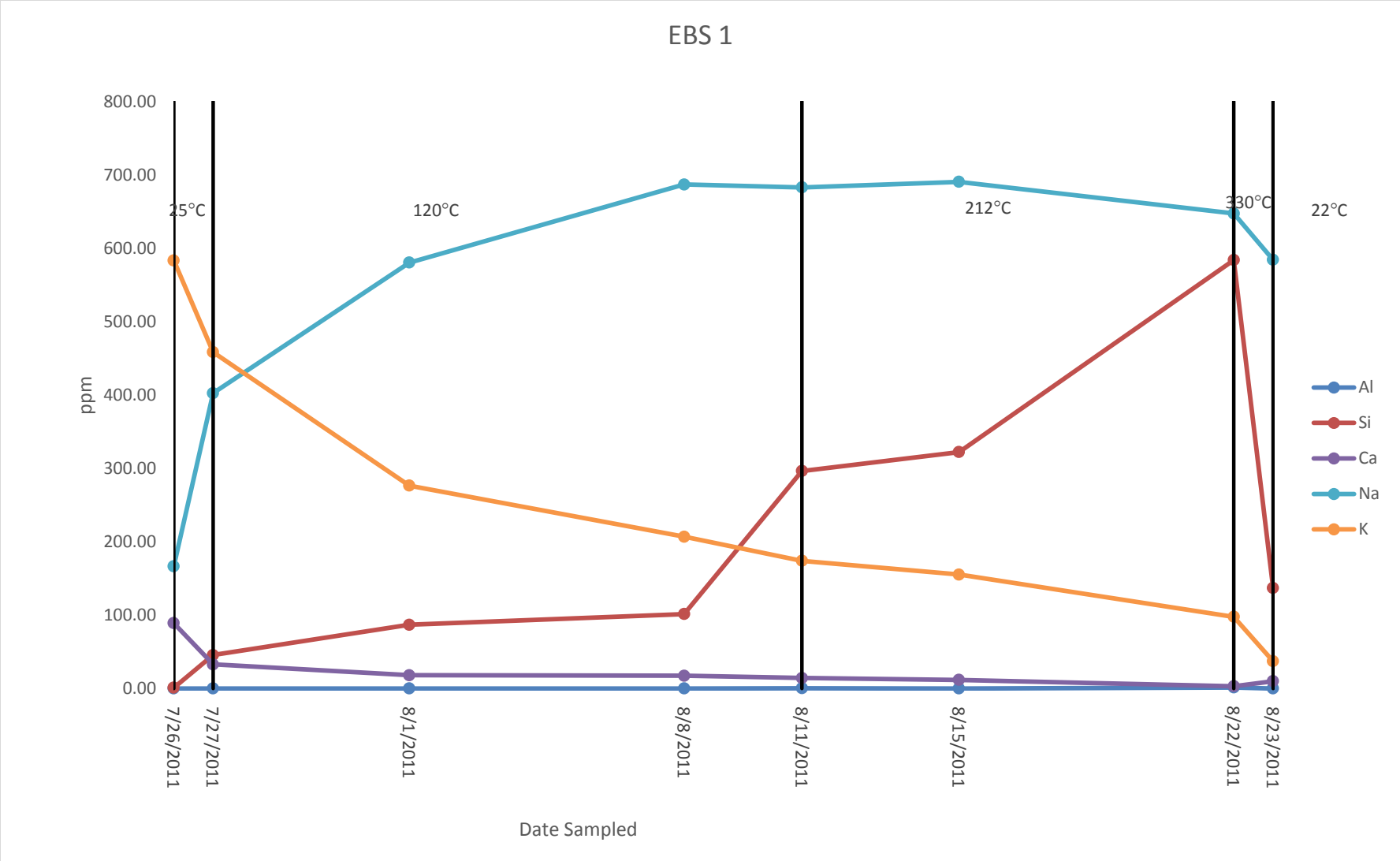
Sample ID	Date analyzed	Date Sampled	Al	B	Std. D.	Ba	Ca	Std. D.	Fe	K	Std. D.	Li	Mn	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	+/-	ppm	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Ppm	Sum	Sum	
EBS 16/00 F	7/24/2014	5/15/2014	0.36	<0.02		<0.01	69	0	<0.1	540	10	<0.01	<0.01	191	2	1	0	2	0	0.05	0.14	802	26	0	1.00
EBS 16/01 F	7/24/2014	5/15/2014	2.73	6.52	0.04	<0.01	<0.1		<0.1	179	2	<0.01	<0.01	476	2	381	4	815	9	0.12	0.12	1479	26	0	0.98
EBS 16/02 F	7/24/2014	5/29/2014	1.53	8.26	0.14	<0.01	<0.1		<0.1	45	1	0.07	<0.01	553	6	465	2	995	5	0.12	0.10	1603	25	0	0.97
EBS 16/03 F	7/24/2014	6/18/2014	1.49	8.40	0.05	0.01	<0.1		<0.1	45	0	0.10	<0.01	576	8	469	2	1003	5	0.13	0.09	1634	26	0	0.97
EBS 16/4 F	11/6/2014	7/6/2014	0.79	7.75	0.05	0.04	3	0	<0.2	53	0	0.17	<0.02	565	4	484	3	1036	6	0.03	0.03	1666	26	0	0.97
EBS 16/5 F	11/6/2014	7/31/2014	0.66	8.48	0.05	0.07	5	0	<0.2	64	0	0.21	<0.02	582	3	269	39	576	84	0.04	0.07	1236	27	0	0.97
EBS 16/6 F	11/6/2014	8/21/2014	<0.02	7.52	0.13	0.28	10	1	<0.2	66	0	<0.02	<0.02	650	6	14	1	29	1	<0.02	0.40	763	30	0	0.98
EBS 16/7 F	11/6/2014	9/18/2014	0.52	7.76	0.03	0.11	5	0	<0.2	56	1	0.08	<0.02	559	6	229	2	489	4	0.03	0.16	1117	26	0	0.97
EBS 16/8 F	11/6/2014	9/30/2014	<0.02	7.63	0.05	0.18	8	0	<0.2	59	0	0.17	<0.02	611	4	292	2	624	4	0.09	0.22	1311	28	0	0.98
EBS 16/9 F	11/6/2014	10/9/2014	<0.02	7.72	0.03	0.17	7	0	<0.2	68	0	0.24	<0.02	653	3	311	2	666	5	0.08	0.26	1403	31	0	0.98
EBS 16/10 F	11/6/2014	10/20/2014	<0.02	7.85	0.04	0.17	8	0	<0.2	64	0	0.21	<0.02	661	6	303	1	649	2	0.08	0.24	1390	31	0	0.98
EBS 16/11 F	11/6/2014	10/30/2014	<0.02	8.39	0.06	0.20	8	0	0.3	66	0	0.37	0.04	677	2	207	1	443	2	0.15	0.20	1204	32	0	0.98
EBS 16/12 F																									
EBS 16/13 F																									
EBS 16/14 F																									

EBS-17

Sample ID	Date analyzed	Date Sampled	Al	B	Ba	Ca	Std. D.	Fe	K	Std. D.	Mg	Std. D.	Mn	Na	Std. D.	Si	Std. D.	SiO2	Std. D.	Sr	Zn	TDS	Cation	Anion	Balance
			ppm	ppm	ppm	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	ppm	+/-	ppm	+/-	ppm	+/-	ppm	ppm	Ppm	Sum	Sum	
EBS17/00 F	11/7/2014	6/27/2014	<0.05	<0.1	<0.05	420	3	<0.5	228	3	192	1	<0.05	3834	32	<0.5		<1		0.12	<0.05	4673	208	0	1.00
EBS17/01 F	11/7/2014	7/16/2014	0.47	6.18	0.50	34	1	<0.5	170	1	<0.5		0.05	3987	32	47	0	100	1	0.39	<0.05	4298	179	0	1.00
EBS17/02 F	11/7/2014	7/31/2014	0.70	7.51	0.49	132	1	0.22	138	2	<0.5		0.18	3781	32	37	1	80	1	0.89	0.15	4141	174	0	1.00
EBS17/03 F	11/7/2014	8/7/2014	0.48	6.84	0.65	141	2	0.28	141	3	<0.5		0.29	3614	23	37	4	80	8	0.94	0.21	3987	167	0	1.00
EBS17/04 F	11/7/2014	8/14/2014	0.34	6.55	0.78	142	1	0.36	141	1	<0.5		0.39	3482	11	36	0	77	1	0.97	0.22	3852	162	0	1.00
EBS17/05 F	11/7/2014	8/21/2014	0.37	7.53	0.73	157	2	0.35	150	1	<0.5		0.48	3519	50	45	1	97	1	1.06	0.32	3934	164	0	1.00
EBS17/06 F	11/7/2014	8/26/2014	0.27	6.58	0.77	148	1	0.35	142	2	<0.5		0.47	3337	14	44	1	94	3	0.99	0.31	3731	156	0	1.00
EBS17/07 F	11/7/2014	8/27/2014	<0.05	4.68	0.33	543	5	0.83	95	1	0.7	0.0	0.53	2451	15	54	0	116	1	2.12	0.20	3214	136	0	1.00

APPENDIX C2:

Graphs of Brine Chemistry for EBS Experiments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600.00
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400.00
300.00
200.00
100.00
0.00
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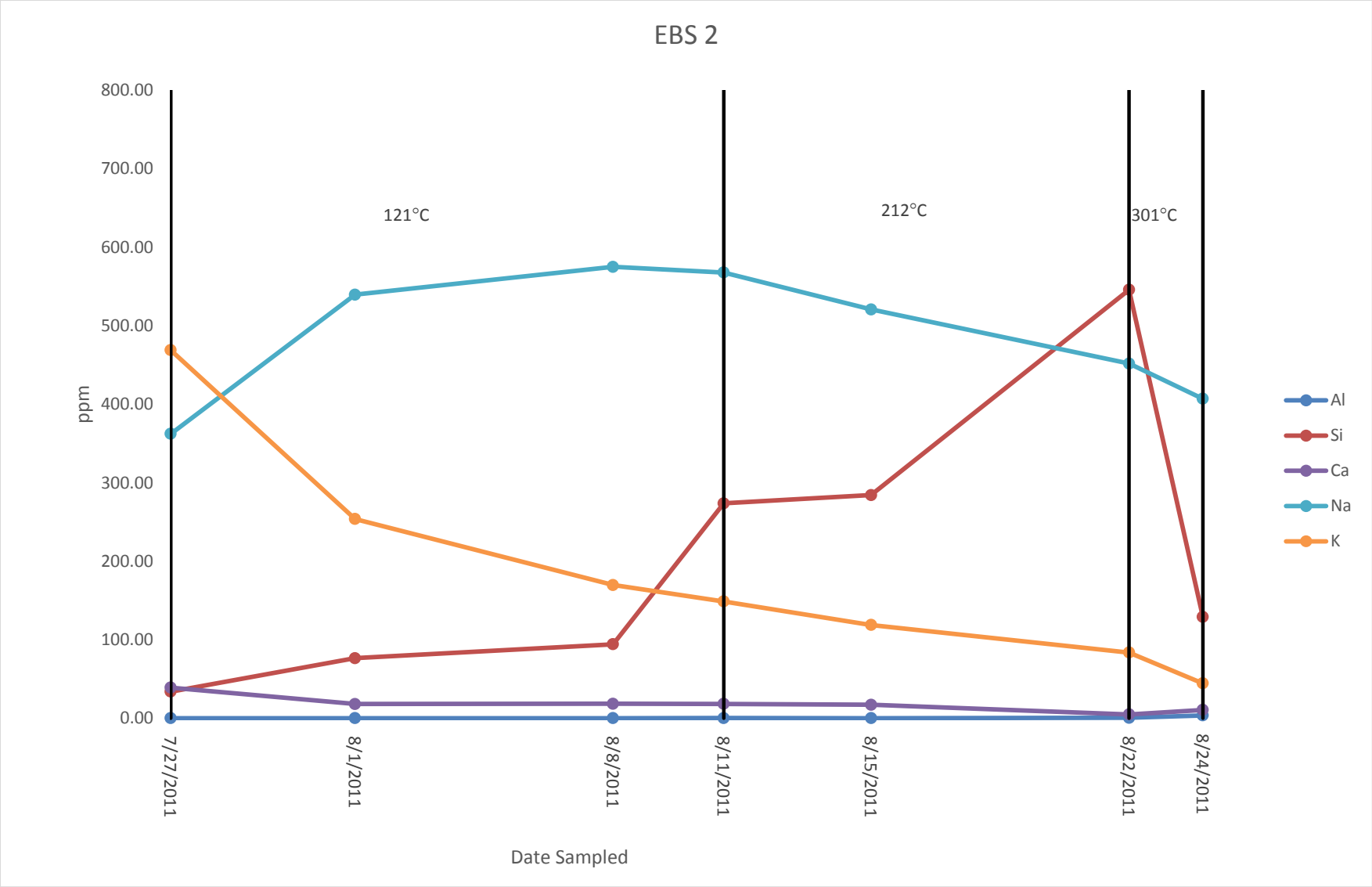
120°C
212°C
330°C
22°C
Al
Si
Ca
Na
K
7/26/2011
7/27/2011
8/1/2011
8/8/2011
8/11/2011
8/15/2011
8/22/2011
8/23/2011
Date Sampled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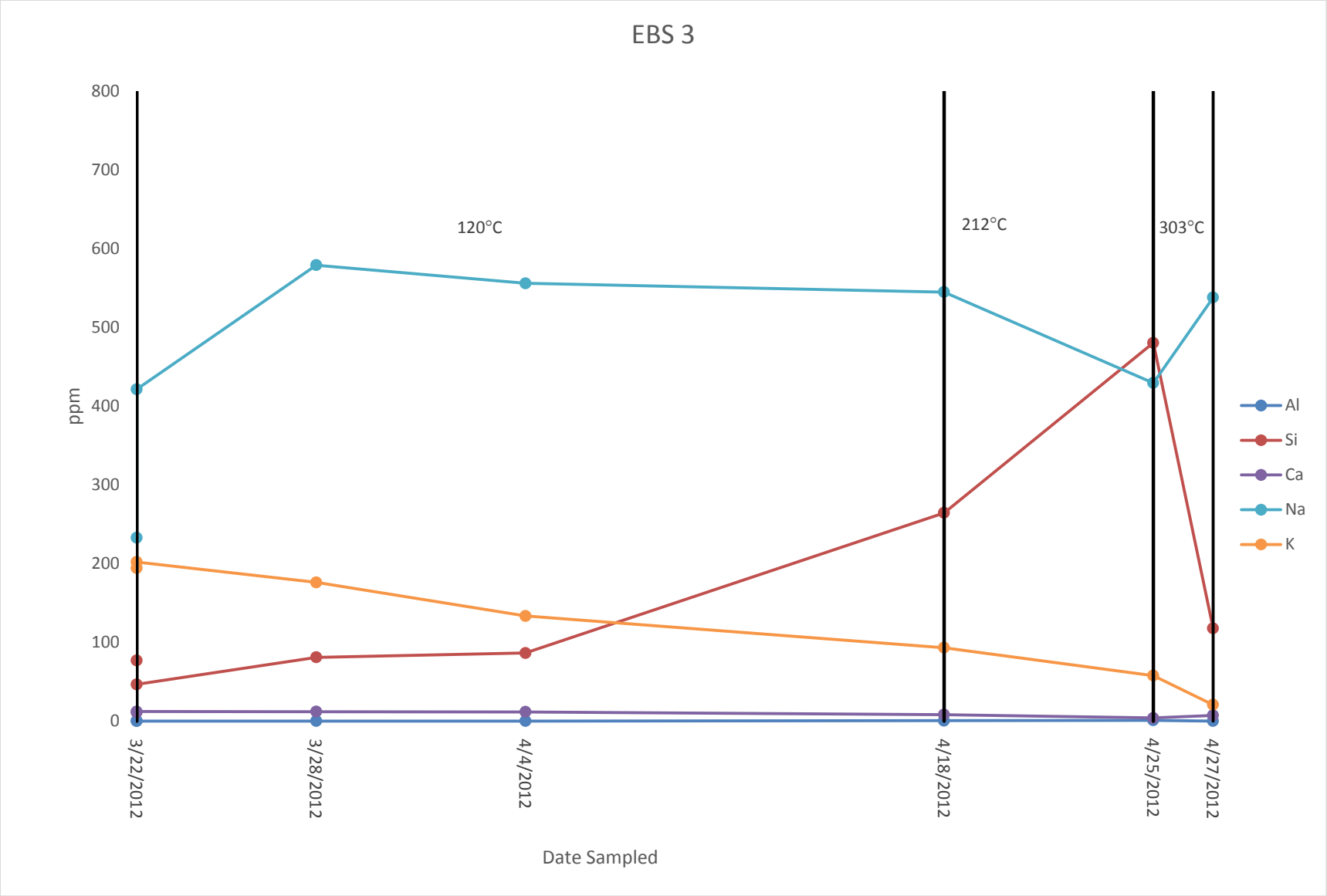
500.00
400.00
300.00
200.00
100.00
0.00
ppm
121°C
212°C
301°C
7/27/2011
8/1/2011
8/8/2011
8/11/2011
8/15/2011
8/22/2011
8/24/2011
Date Sampled
Al
Si
Ca
Na
K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700
600
500
400
300
200
100
0
ppm
120°C
212°C
303°C
3/22/2012
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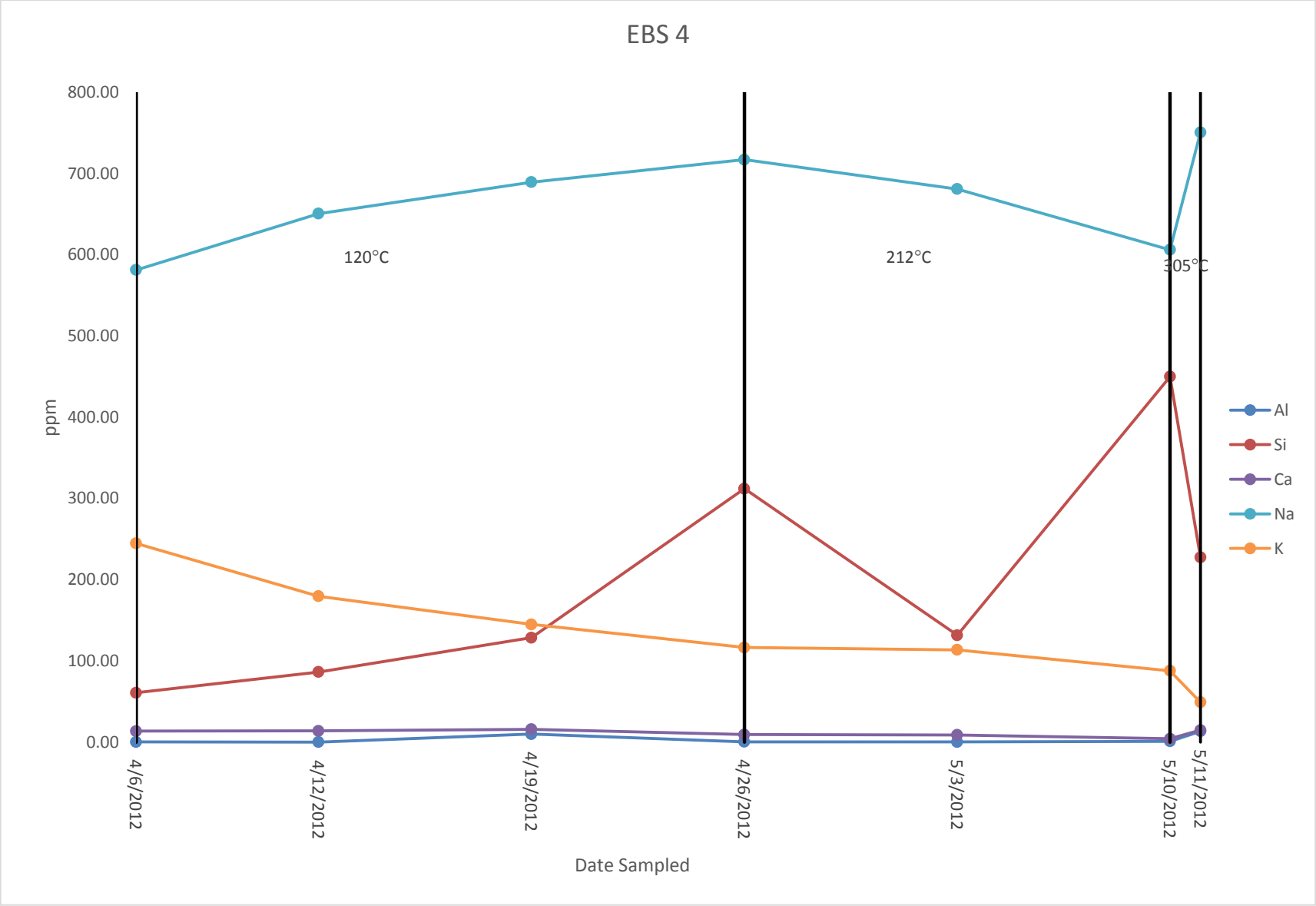
4/27/2012
Date Sampled
Al
Si
Ca
Na
K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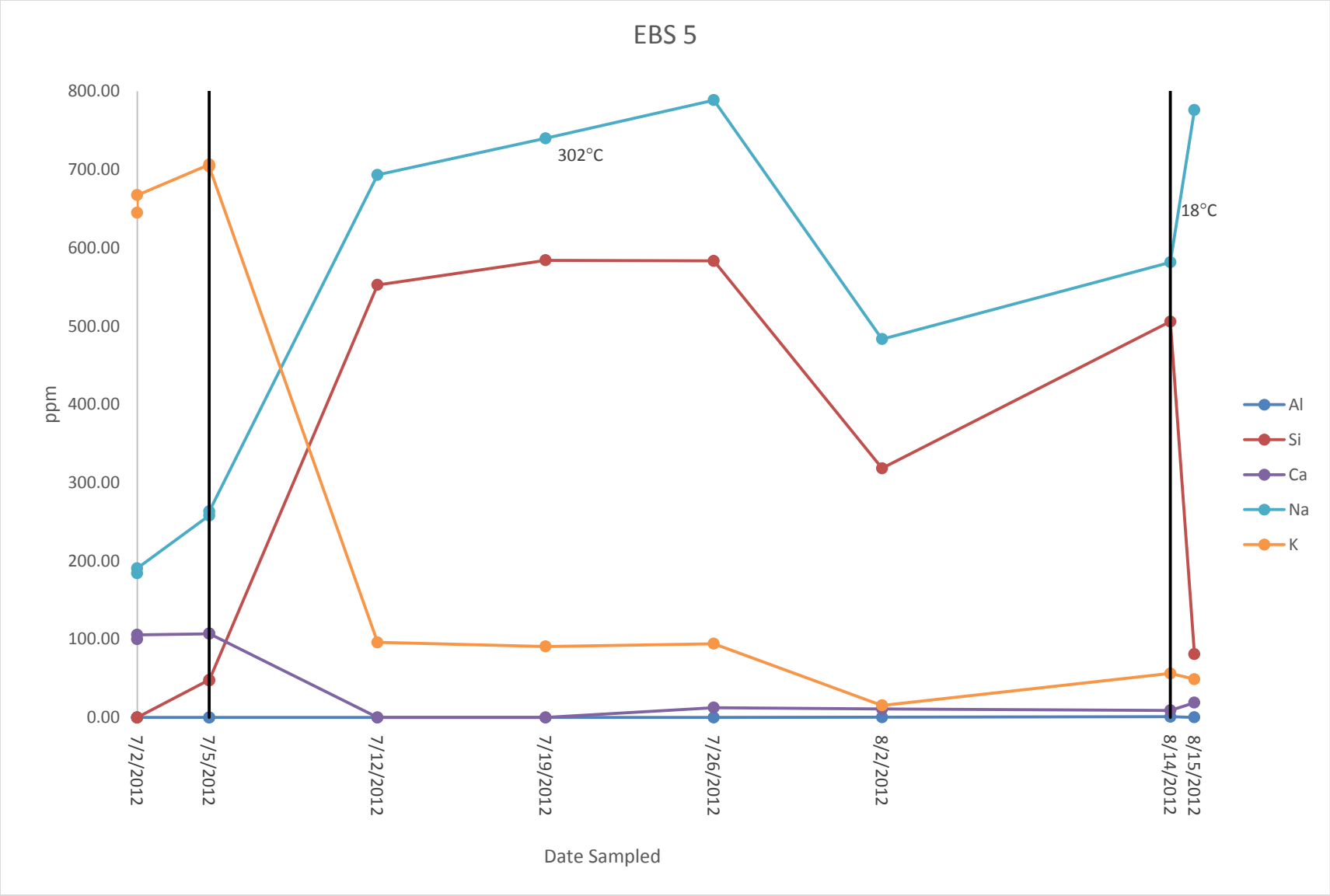
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
120°C
212°C
305°C
Al
Si
Ca
Na
K
4/6/2012
4/12/2012
4/19/2012
4/26/2012
5/3/2012
5/10/2012
5/11/2012
Date Sampled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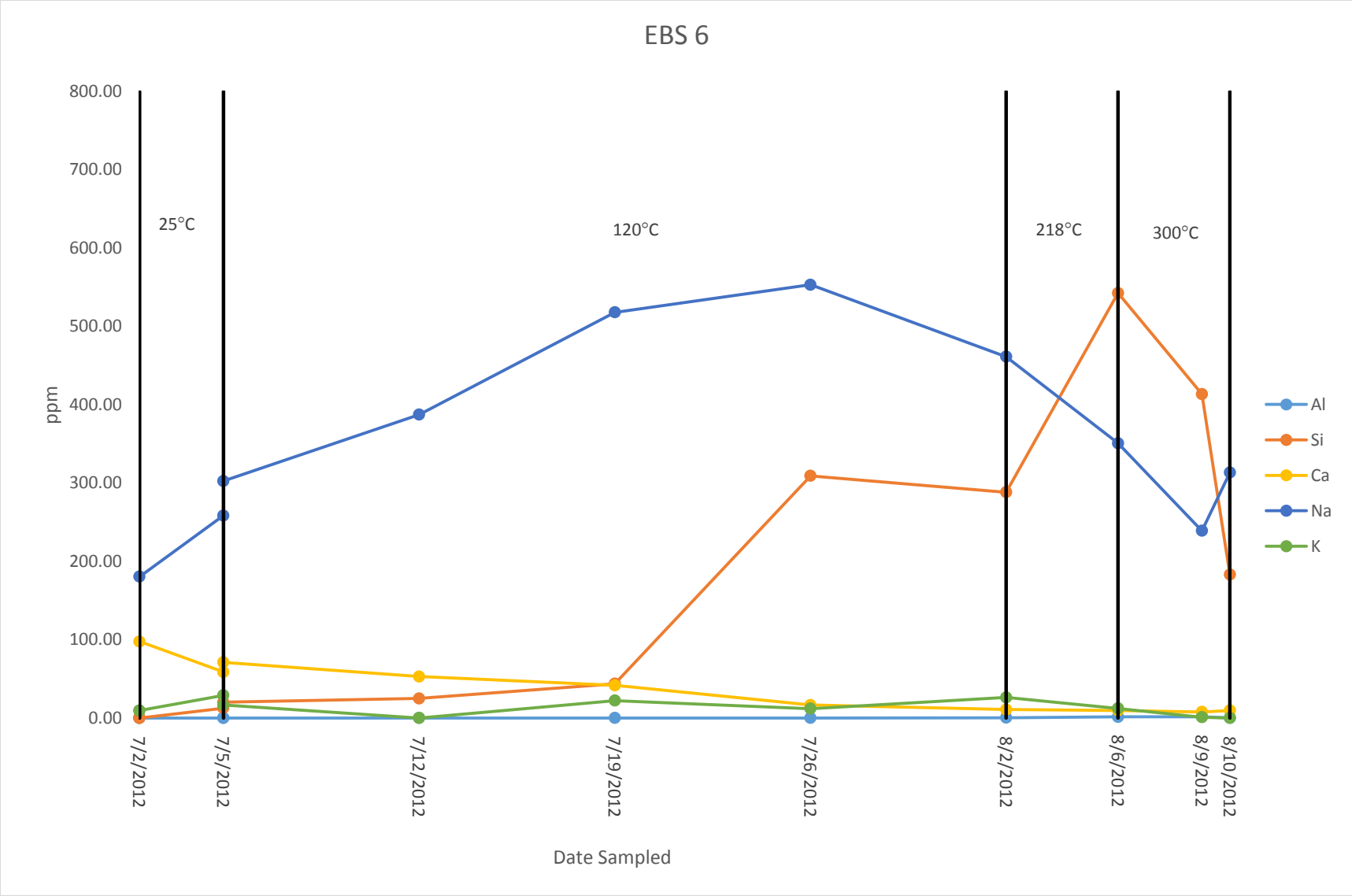
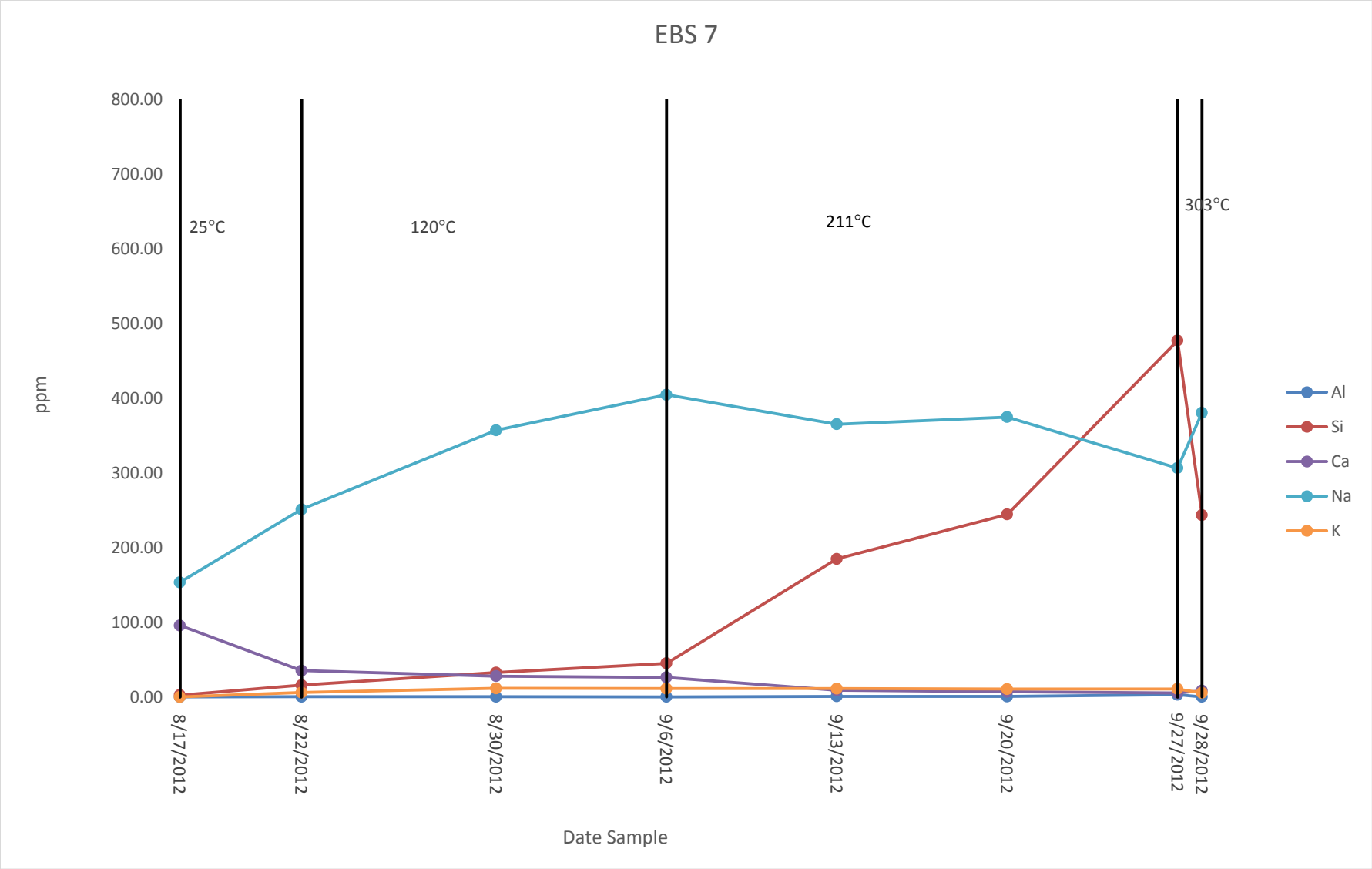
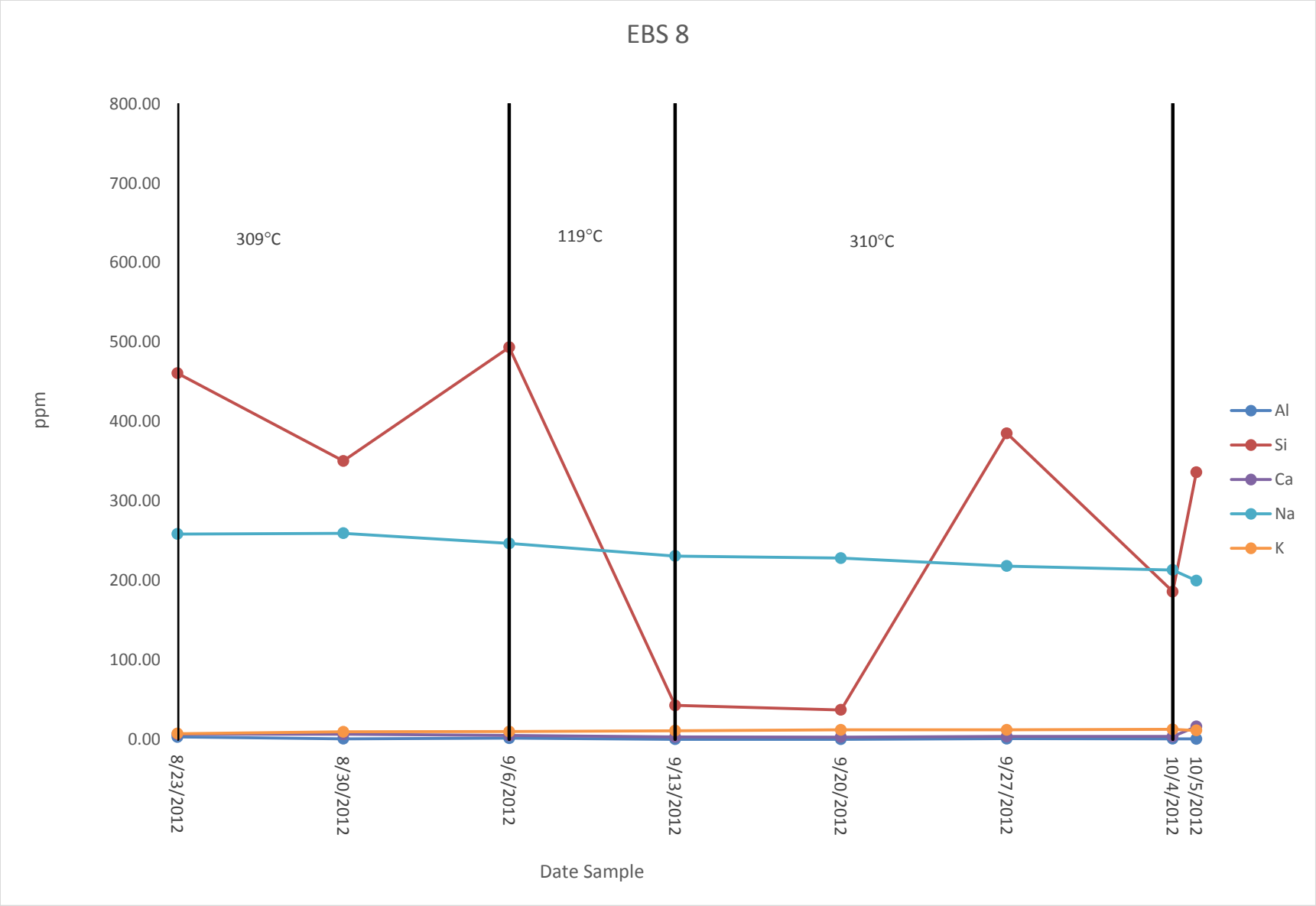
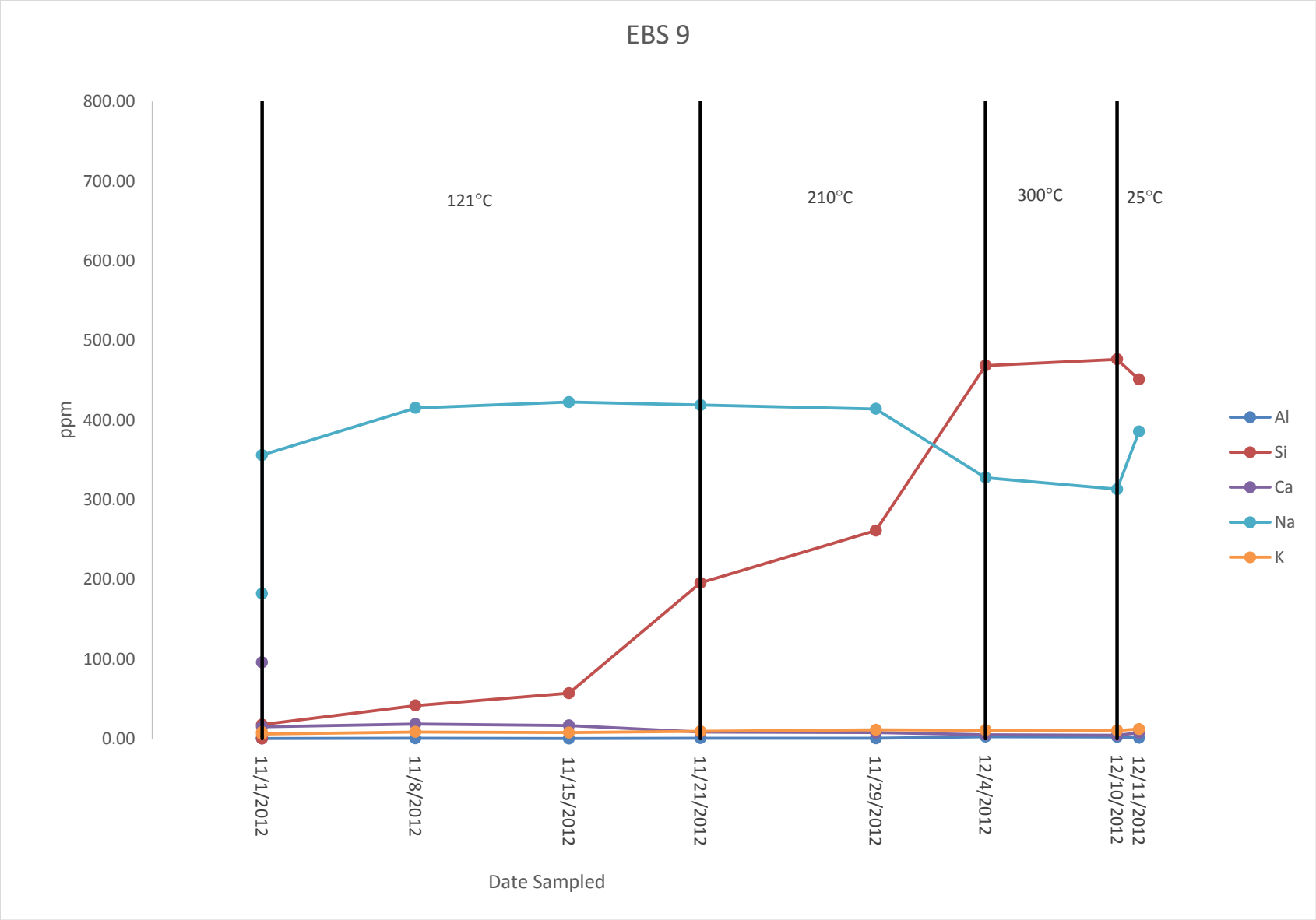
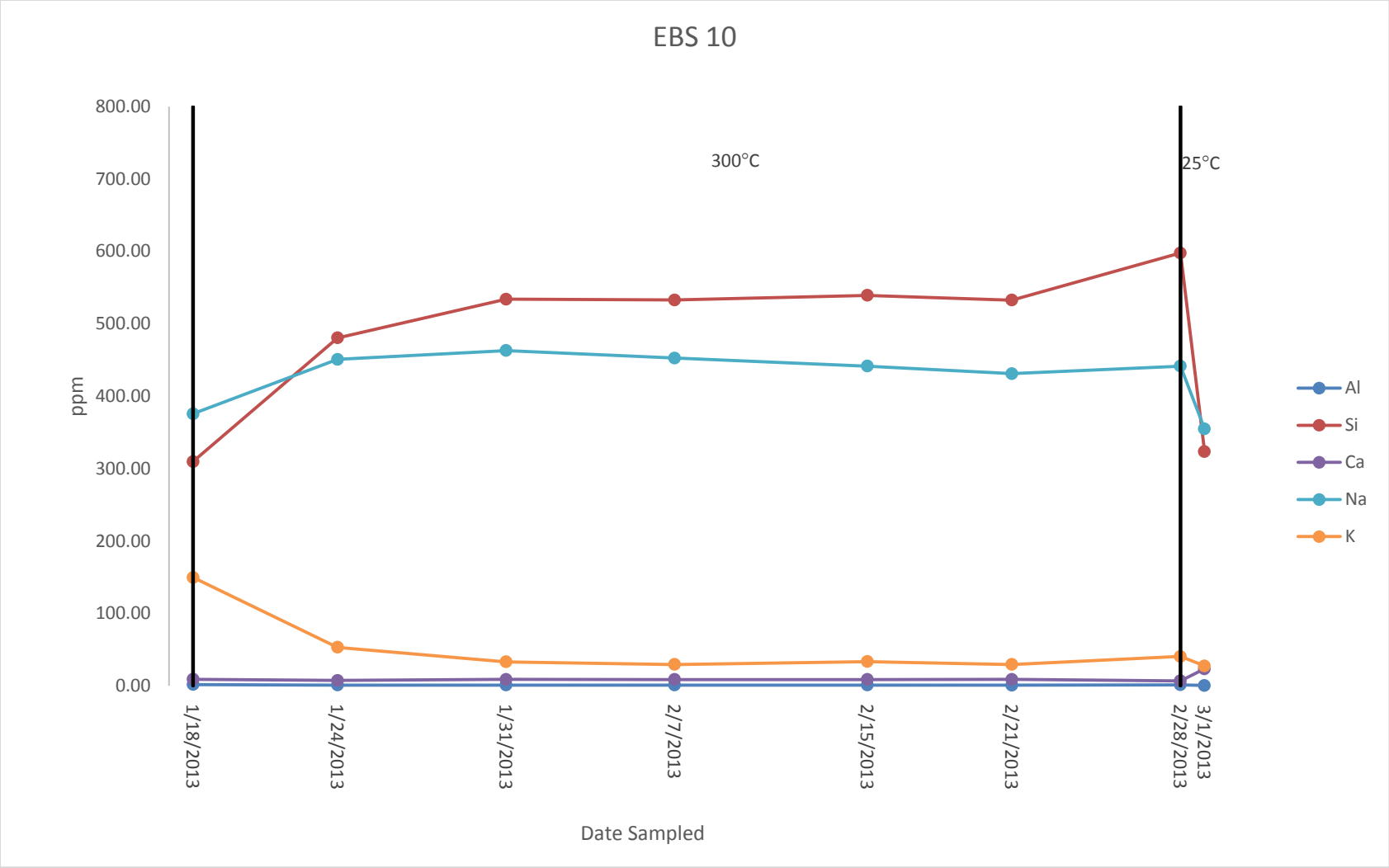
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
302°C
18°C
7/2/2012
7/5/2012
7/12/2012
7/19/2012
7/26/2012
8/2/2012
8/14/2012
8/15/2012
Date Sampled
Al
Si
Ca
Na
K

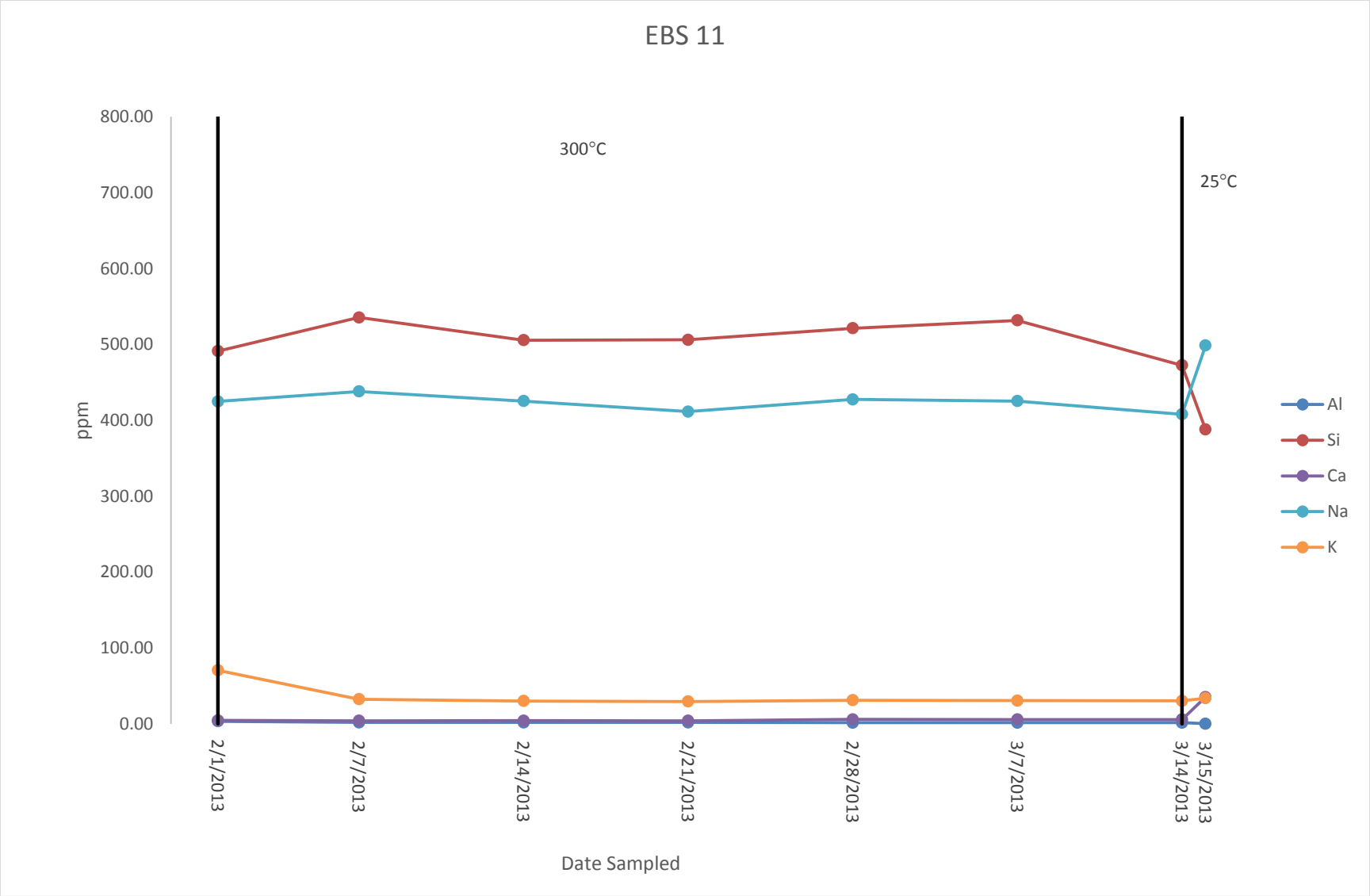

EBS 6
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
25°C
120°C
218°C
300°C
7/2/2012
7/5/2012
7/12/2012
7/19/2012
7/26/2012
8/2/2012
8/6/2012
8/9/2012
8/10/2012
Date Sampled
Al
Si
Ca
Na
K

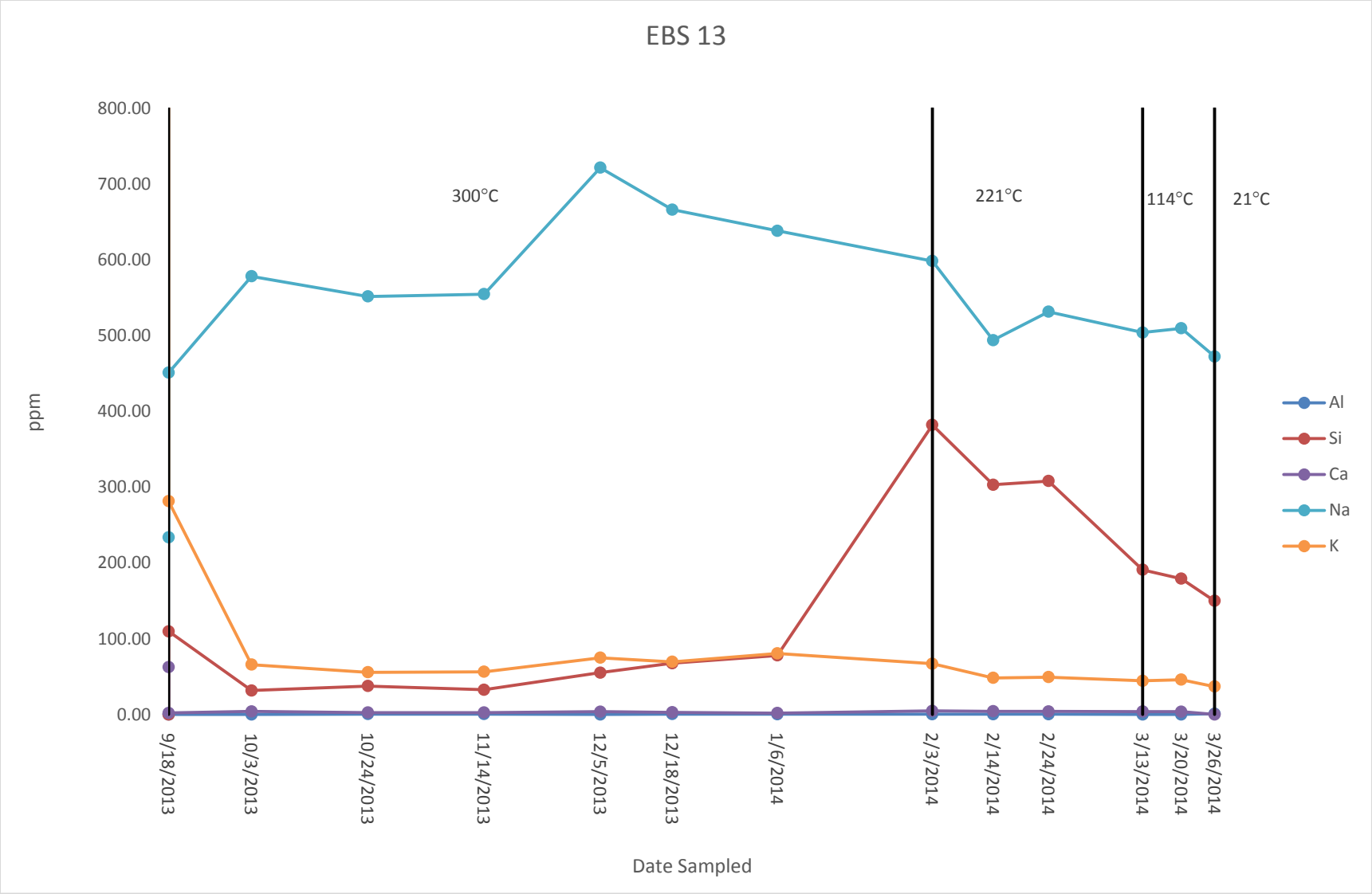

EBS 7
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
25°C
120°C
211°C
303°C
8/17/2012
8/22/2012
8/30/2012
9/6/2012
9/13/2012
9/20/2012
9/27/2012
9/28/2012
Date Sample
Al
Si
Ca
Na
K

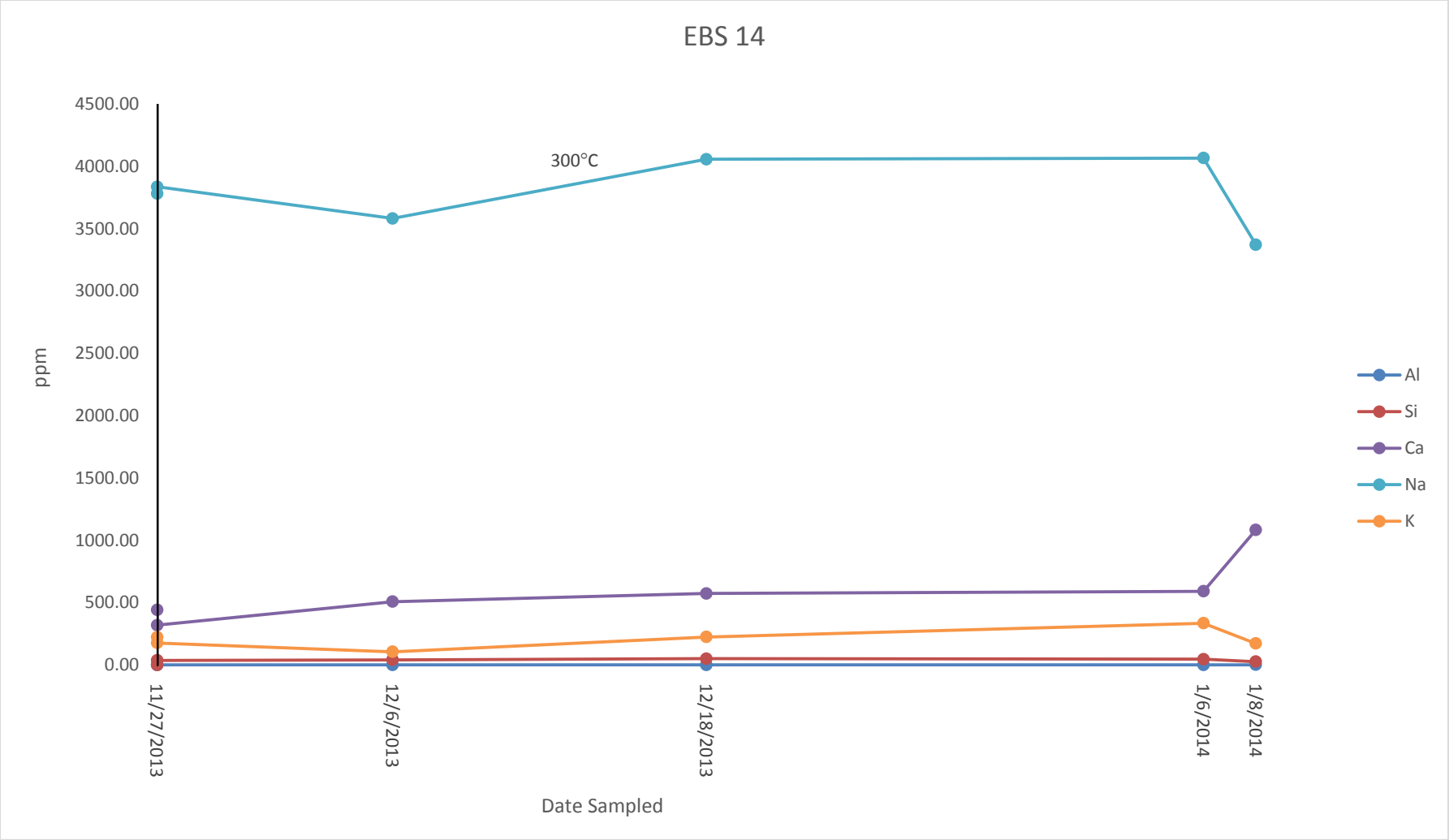

EBS 8
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
309°C
119°C
310°C
8/23/2012
8/30/2012
9/6/2012
9/13/2012
9/20/2012
9/27/2012
10/4/2012
10/5/2012
Date Sample
Al
Si
Ca
Na
K

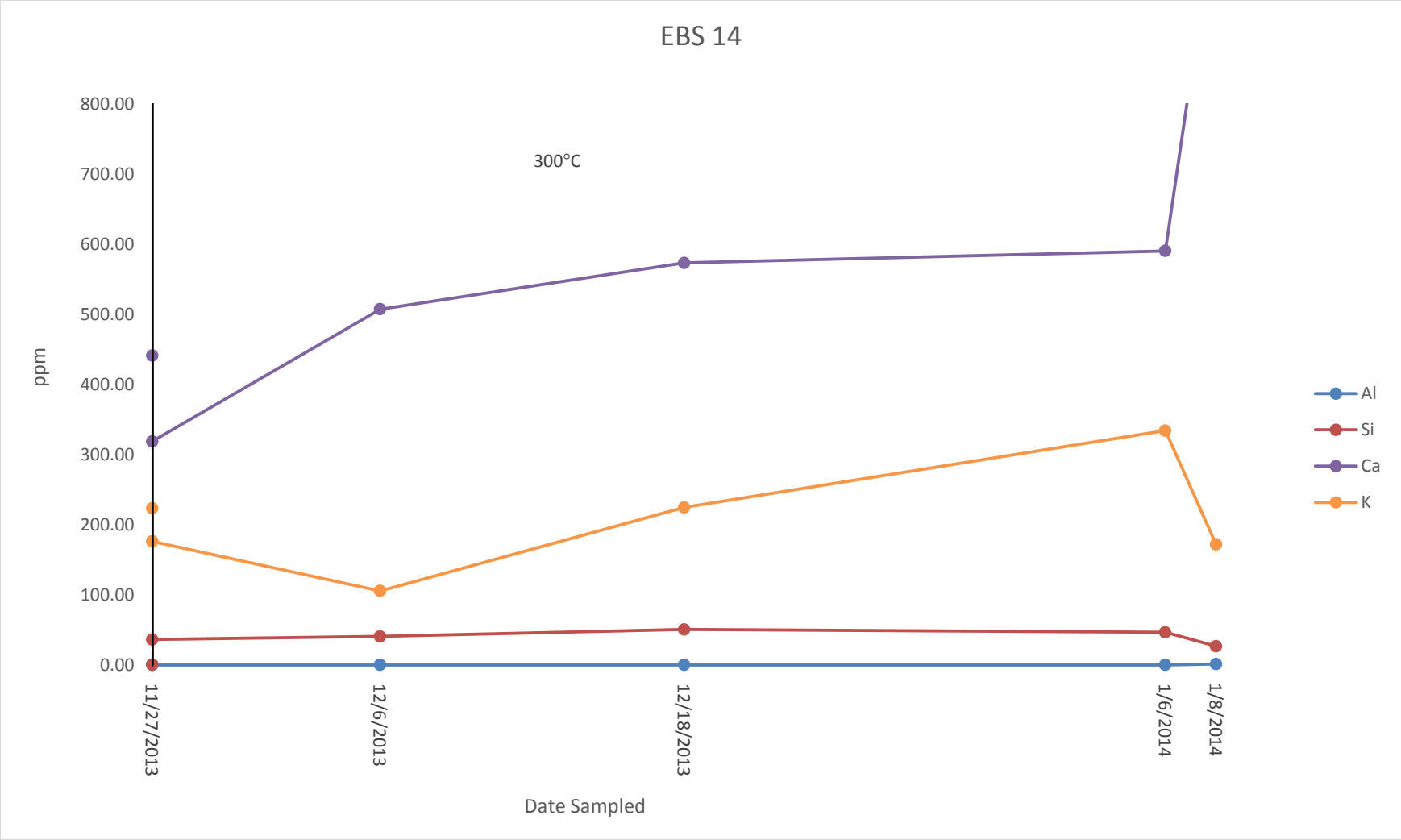

EBS 9
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
121°C
210°C
300°C
25°C
11/1/2012
11/8/2012
11/15/2012
11/21/2012
11/29/2012
12/4/2012
12/10/2012
12/11/2012
Date Sampled
Al
Si
Ca
Na
K

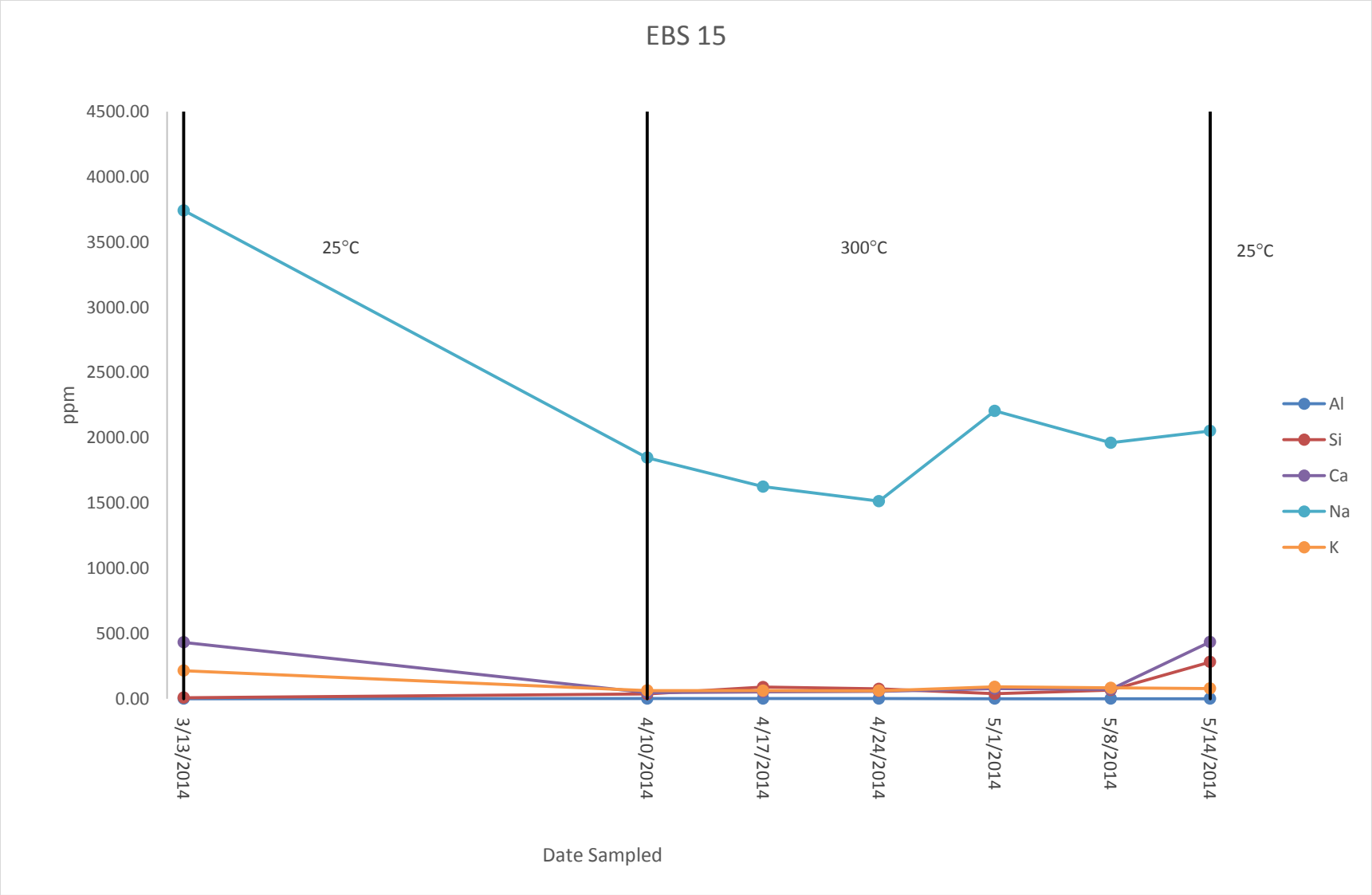

EBS 10
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
300°C
25°C
1/18/2013
1/24/2013
1/31/2013
2/7/2013
2/15/2013
2/21/2013
2/28/2013
3/1/2013
Date Sampled
Al
Si
Ca
Na
K

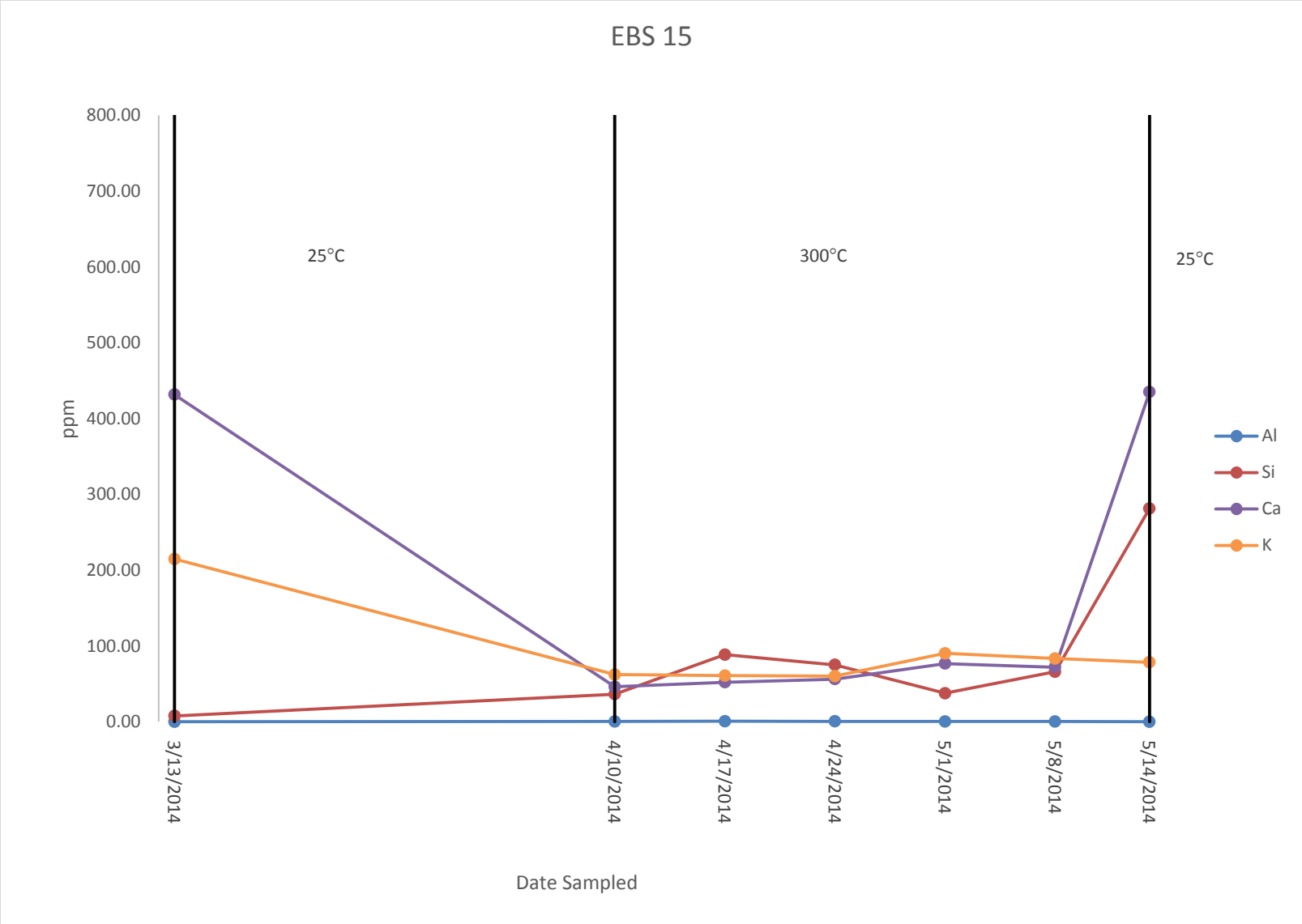

EBS 11
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
300°C
25°C
2/1/2013
2/7/2013
2/14/2013
2/21/2013
2/28/2013
3/7/2013
3/14/2013
3/15/2013
Date Sampled
Al
Si
Ca
Na
K

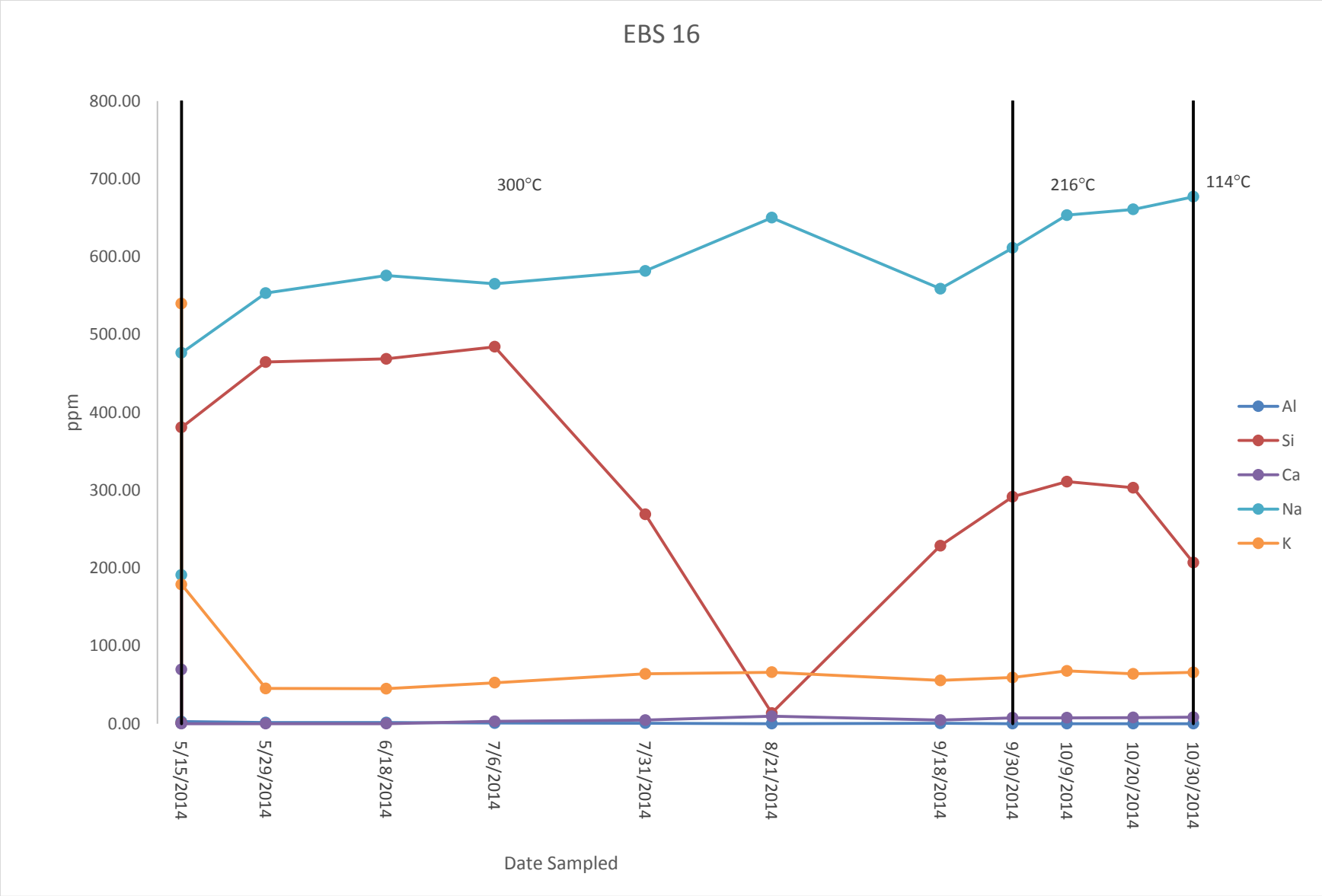

EBS 13
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
300°C
221°C
114°C
21°C
Al
Si
Ca
Na
K
9/18/2013
10/3/2013
10/24/2013
11/14/2013
12/5/2013
12/18/2013
1/6/2014
2/3/2014
2/14/2014
2/24/2014
3/13/2014
3/20/2014
3/26/2014
Date Sampled

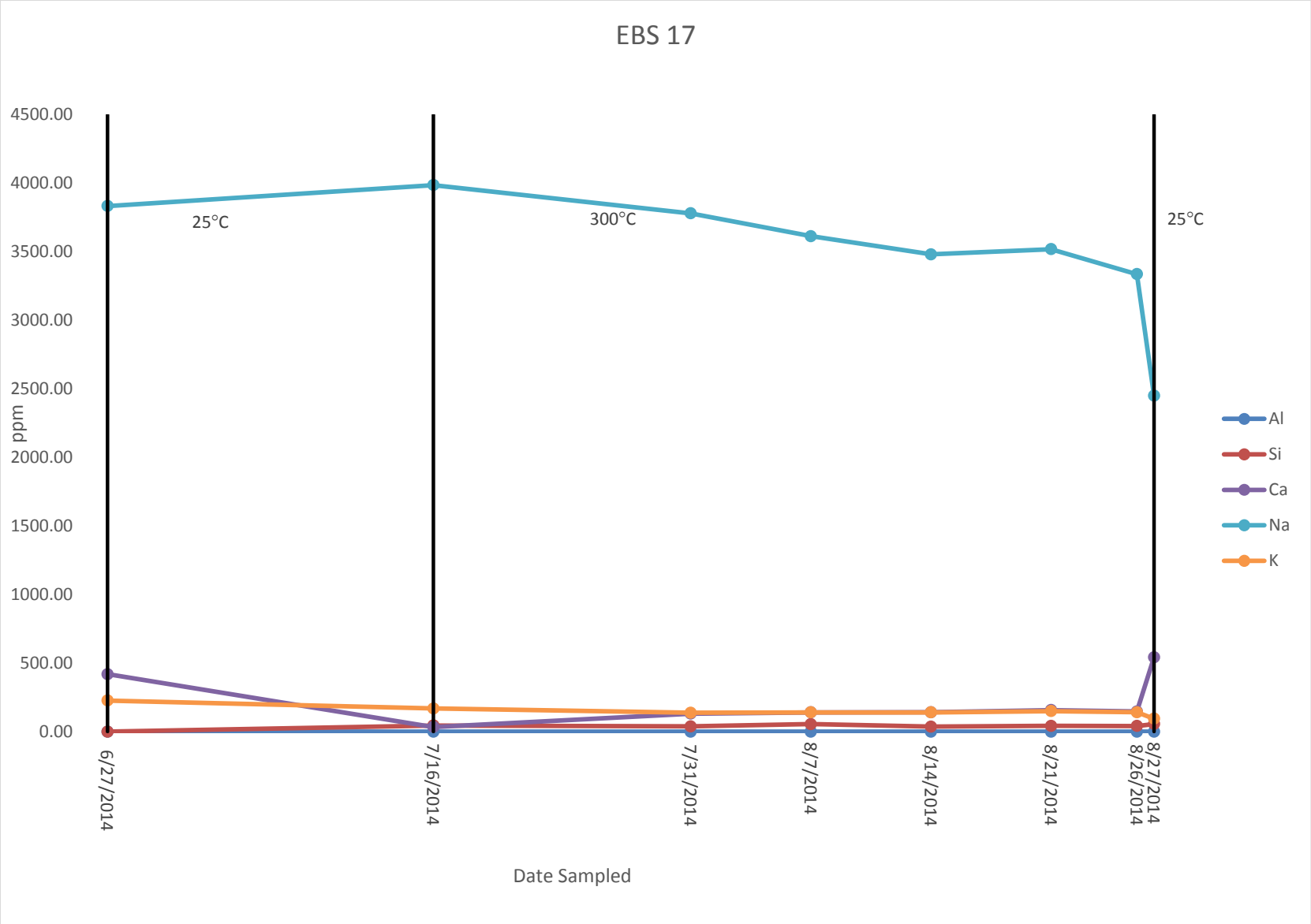

EBS 14
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
ppm
300°C
11/27/2013
12/6/2013
12/18/2013
1/6/2014
1/8/2014
Date Sampled
Al
Si
Ca
Na
K

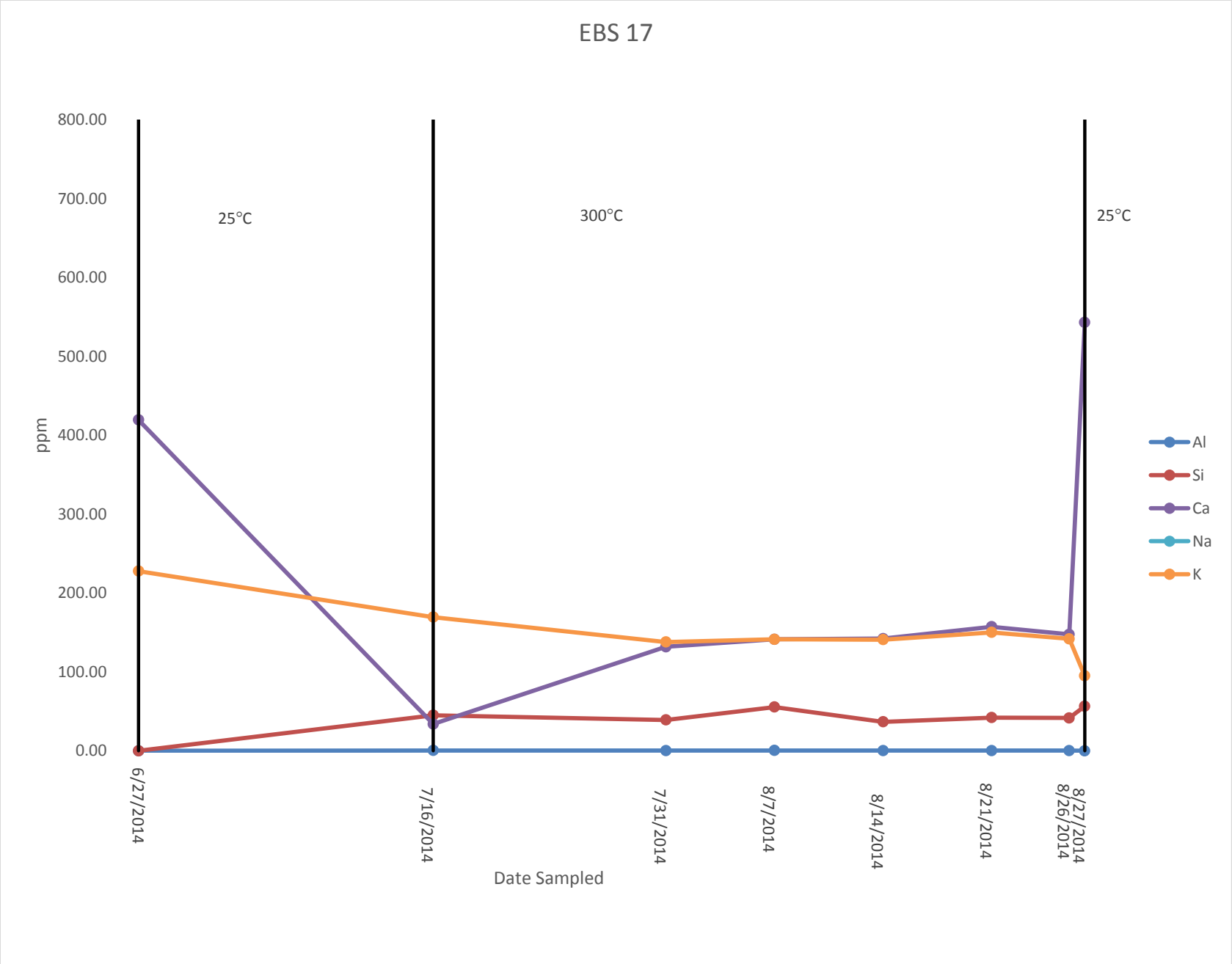

EBS 14
300°C
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
11/27/2013
12/6/2013
12/18/2013
1/6/2014
1/8/2014
Date Sampled
Al
Si
Ca
K


EBS 15
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
ppm
25°C
300°C
25°C
Al
Si
Ca
Na
K
3/13/2014
4/10/2014
4/17/2014
4/24/2014
5/1/2014
5/8/2014
5/14/2014
Date Sampled


EBS 15
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
25°C
300°C
25°C
Al
Si
Ca
K
3/13/2014
4/10/2014
4/17/2014
4/24/2014
5/1/2014
5/8/2014
5/14/2014
Date Sampled


EBS 16
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
300°C
216°C
114°C
Al
Si
Ca
Na
K
5/15/2014
5/29/2014
6/18/2014
7/6/2014
7/31/2014
8/21/2014
9/18/2014
9/30/2014
10/9/2014
10/20/2014
10/30/2014
Date Sampled


EBS 17
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
ppm
25°C
300°C
25°C
Al
Si
Ca
Na
K
6/27/2014
7/16/2014
7/31/2014
8/7/2014
8/14/2014
8/21/2014
8/26/2014
8/27/2014
Date Sampled


EBS 17
800.00
700.00
600.00
500.00
400.00
300.00
200.00
100.00
0.00
ppm
25°C
300°C
25°C
Al
Si
Ca
Na
K
6/27/2014
7/16/2014
7/31/2014
8/7/2014
8/14/2014
8/21/2014
8/26/2014
8/27/2014
Date Sampled