



Nanotube/Nanowire Based ORR Catalyst

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- 2-D surface
 - High area activity
 - High durability
 - Possible high \$ activity
- Supportless/heavier support
 - Thin catalyst layer
 - Good mass transport



Catalyst Schematics

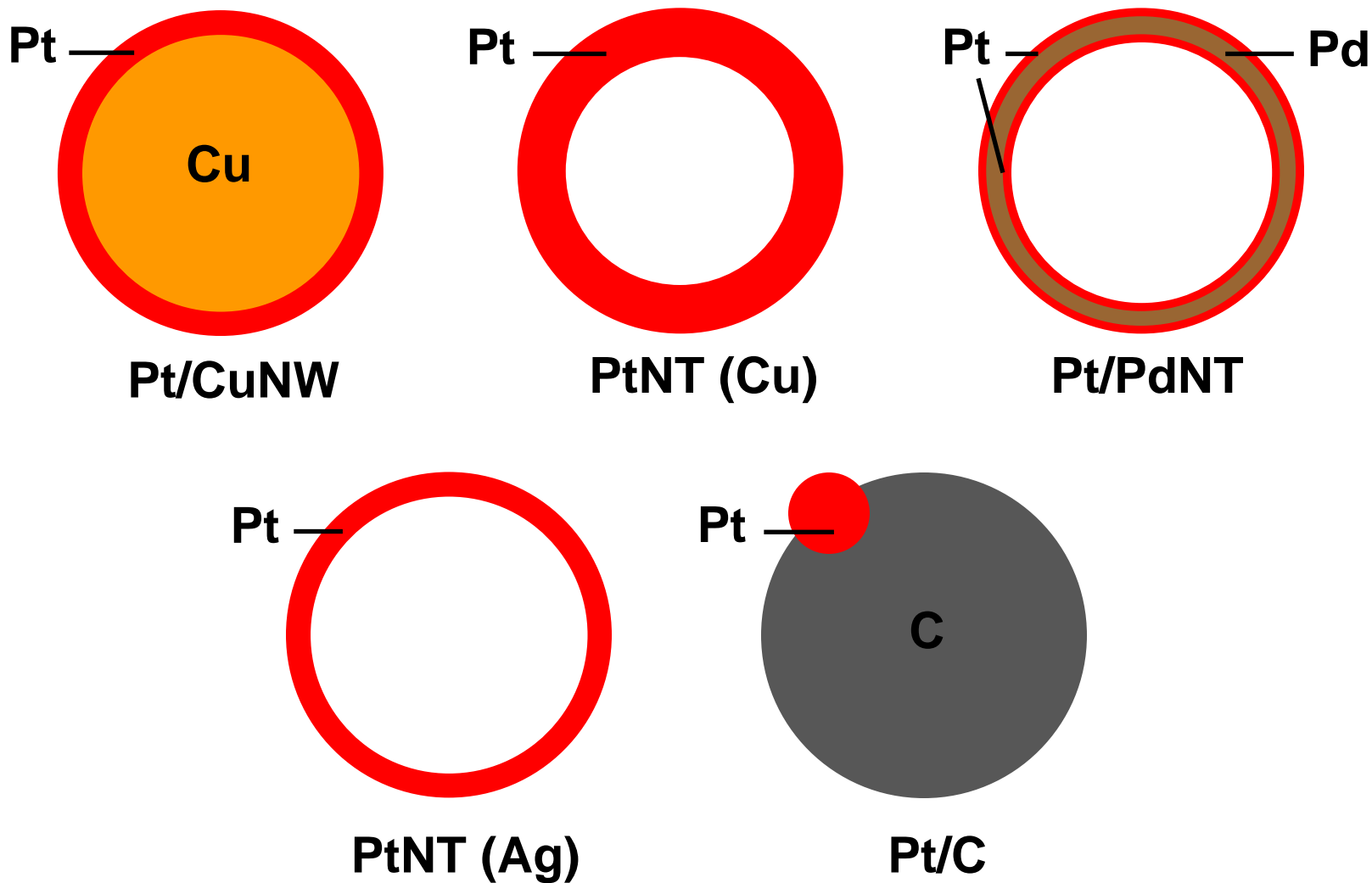


Figure 1. Cross section schematics of Pt/CuNWs, PtNTs (Cu), Pt/PdNTs, PtNTs (Ag), and Pt/C.



Pre Durability

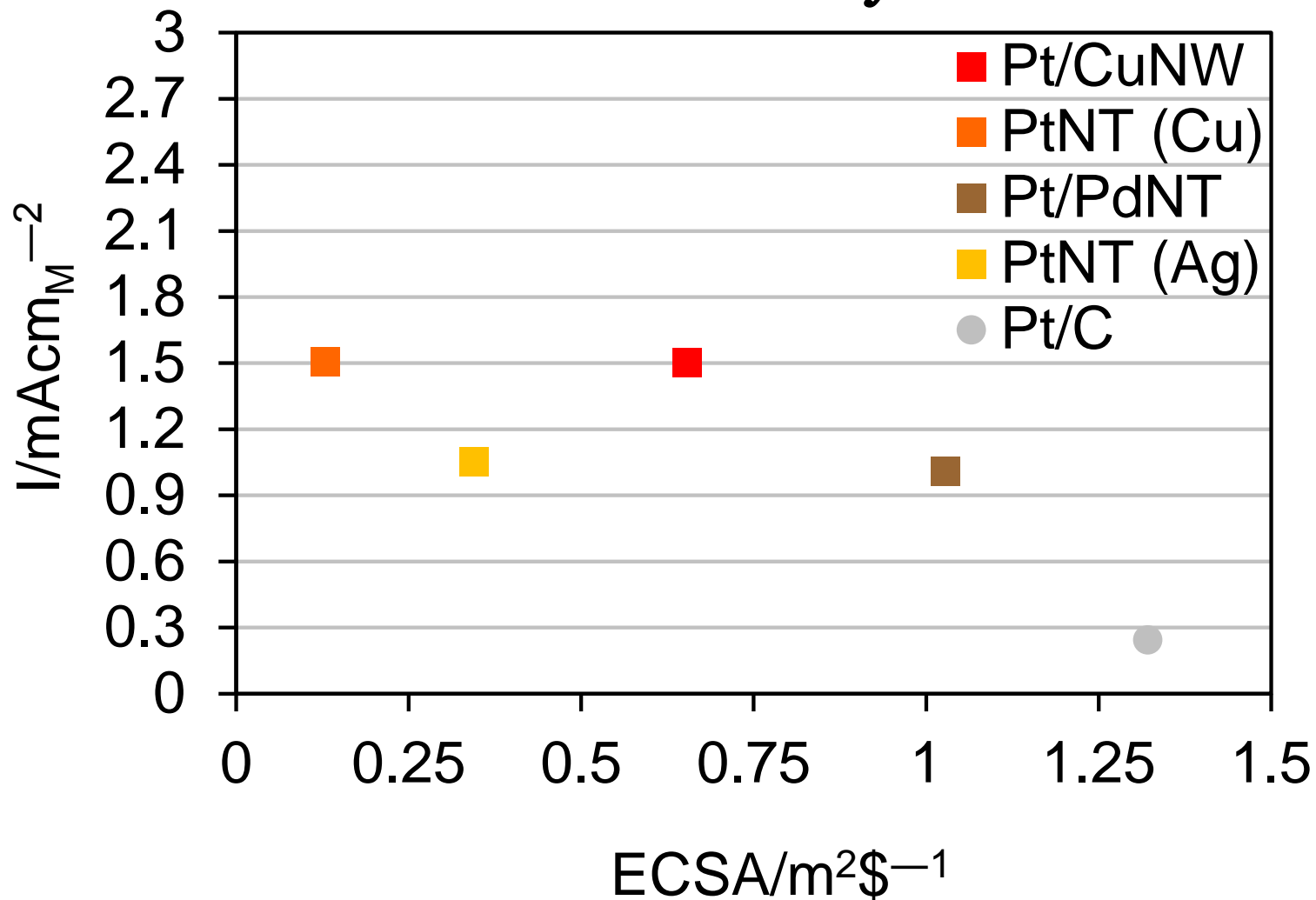


Figure 2. Area activity of Pt/CuNWs, PtNTs (Cu), Pt/PdNTs, PtNTs (Ag), and Pt/C for oxygen reduction prior to durability testing as a function of cost normalized surface area.



Post Durability

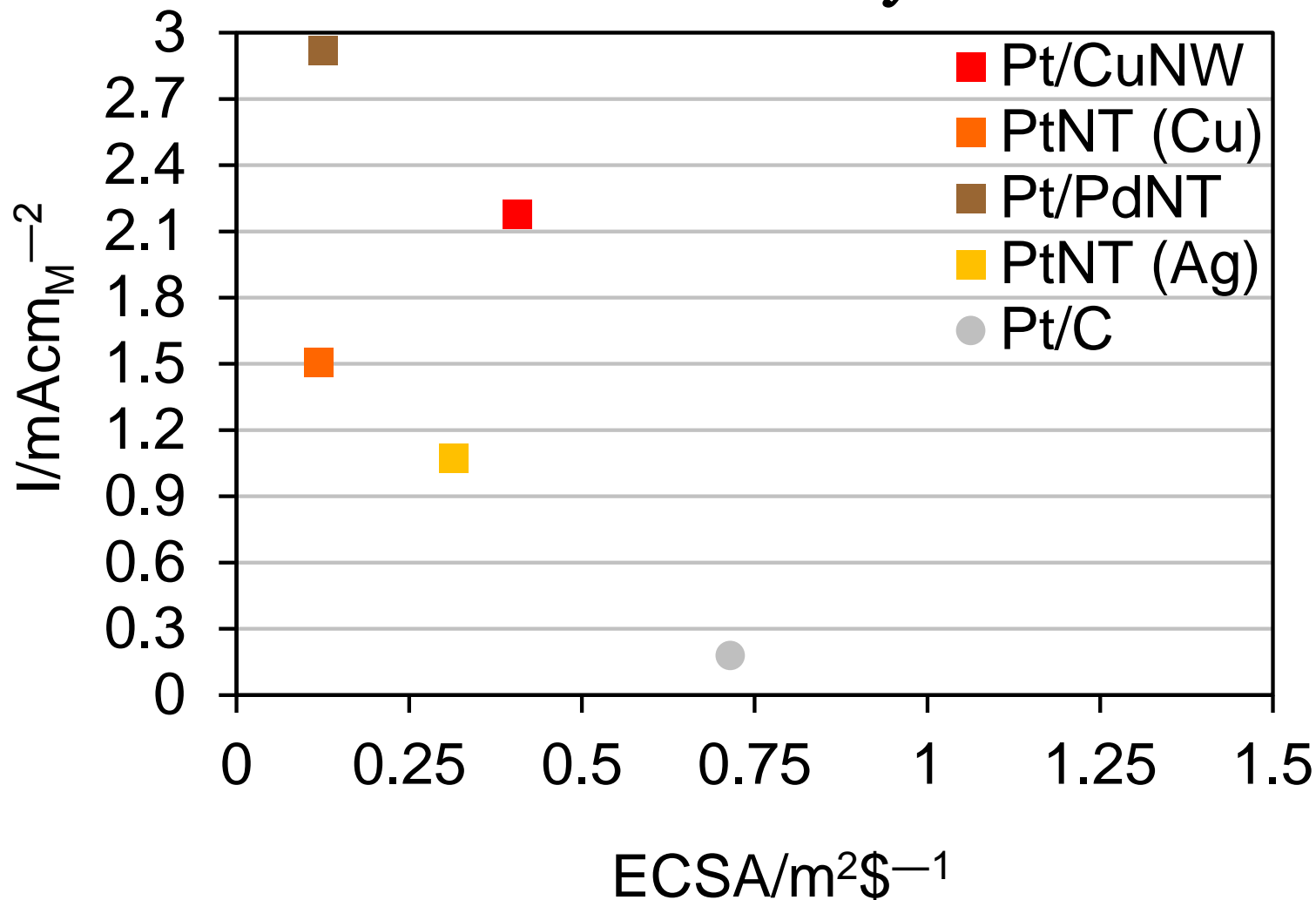


Figure 3. Area activity of Pt/CuNWs, PtNTs (Cu), Pt/PdNTs, PtNTs (Ag), and Pt/C for oxygen reduction following durability testing as a function of cost normalized surface area. Durability testing was completed by potential cycling (30,000 times) between 0.6 and 1.1 V vs. RHE.