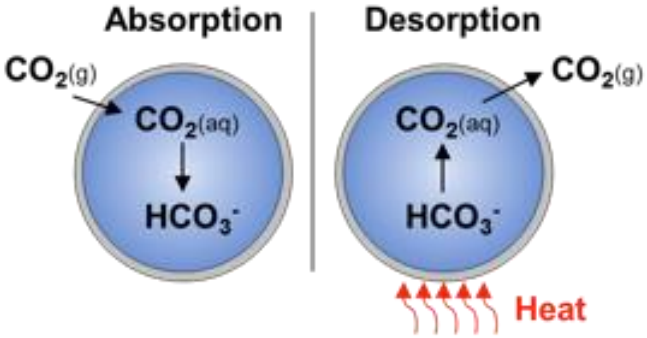
Encapsulated solvents for CO_2 capture and delivery

BETO Algae Cultivation for Carbon Capture and Utilization Workshop

Orlando, FL
May 23, 2017

Jennifer M. Knipe, LLNL

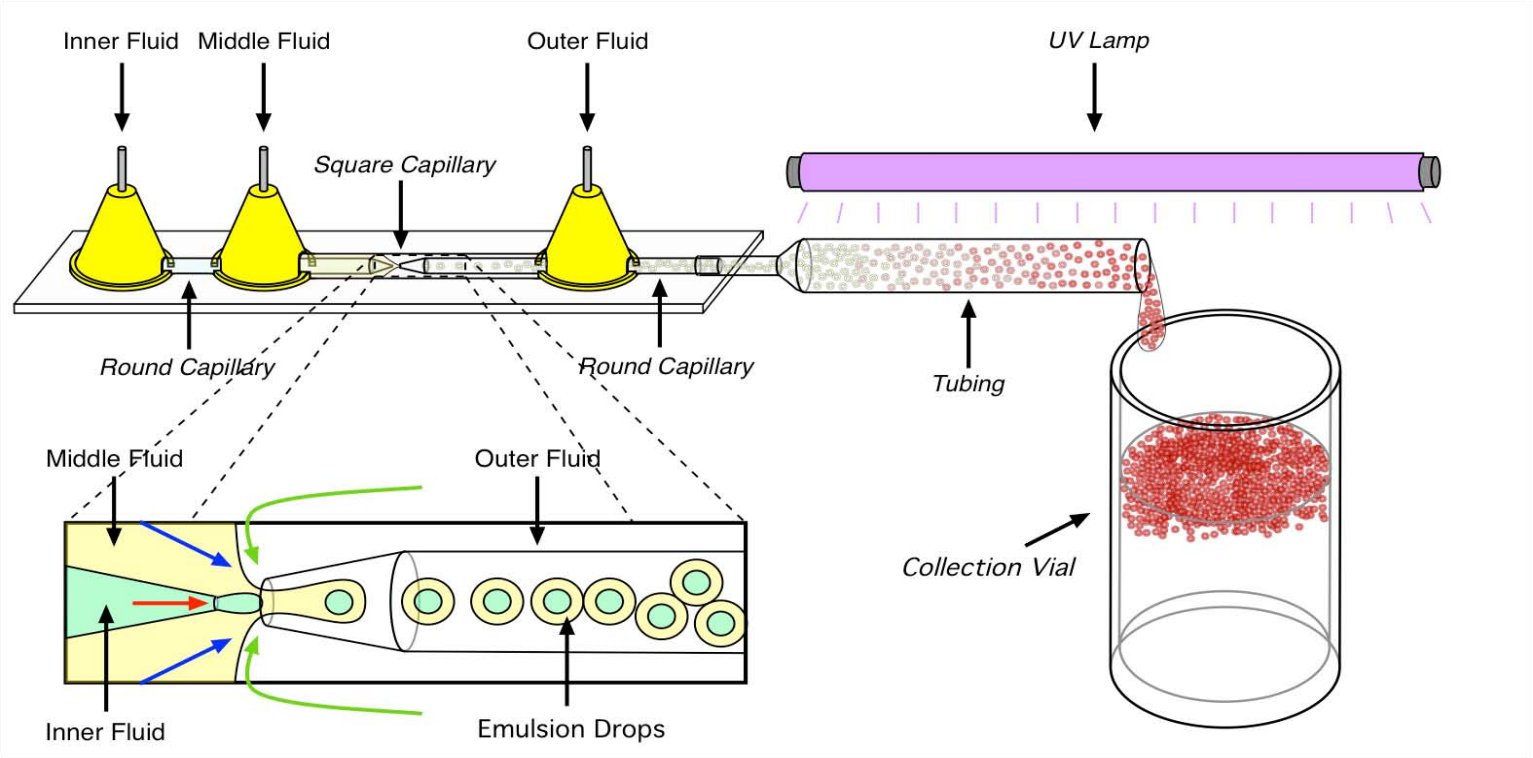


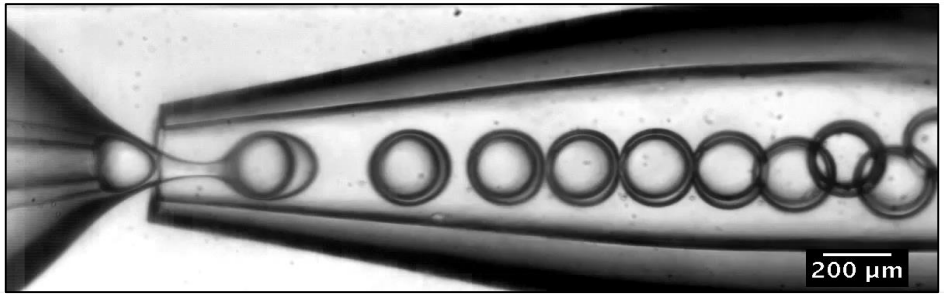
LLNL Project Team: Joshuah K. Stolaroff, Congwang Ye, Du Nguyen, Sarah E. Baker, Jennifer M. Knipe, Katherine M. Ong, William L. Smith, James S. Oakdale, Eric B. Duoss, Bill Bourcier, Christopher M. Spadaccini, and Roger D. Aines

LLNL-PRES-731161
This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344. Lawrence Livermore National Security, LLC

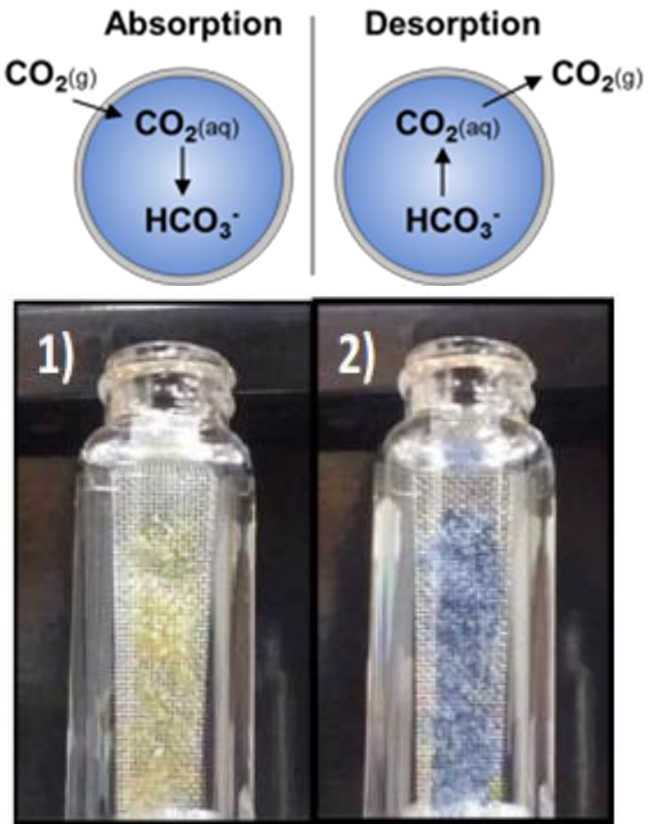
Lawrence Livermore National Laboratory

Microencapsulation: an enabling technology for CO_2 solvents

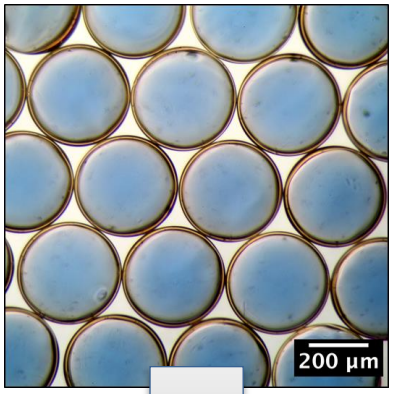




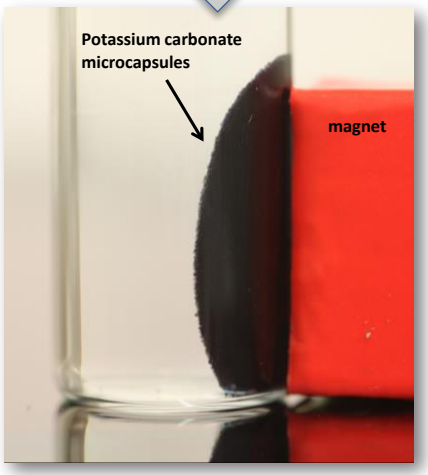
Microcapsules for CO_2 capture and separation



CO_2 loaded capsules are yellow (pH=8) and turn blue (pH= 10.5) as CO_2 is released in marine media

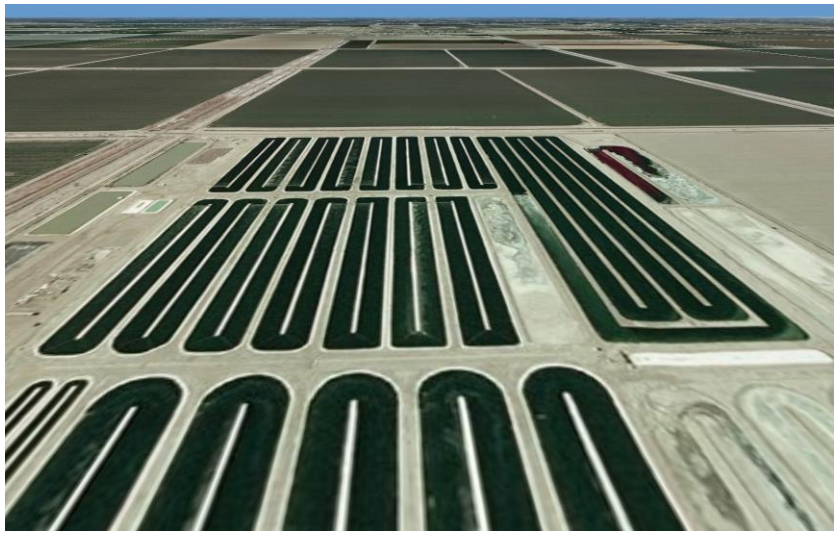


Capsules doped with magnetic nanoparticles



Magnetic separation of capsules from media

Microcapsules can be used for algae production



- CO_2 is at least 20% of costs of algae cultivation
- CO_2 can be delivered by capsule more efficiently
- Save 75% of cost of capture