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Nanostructured Materials for Environmental Remediation of Chlorinated Compounds

EPA – GR832374

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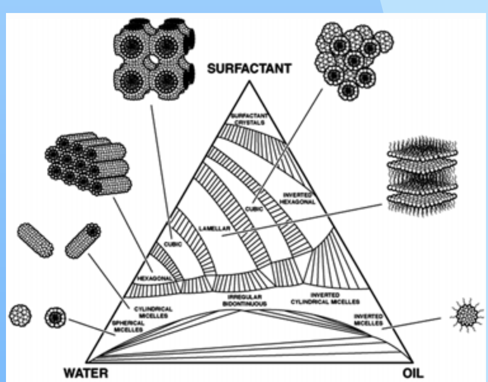
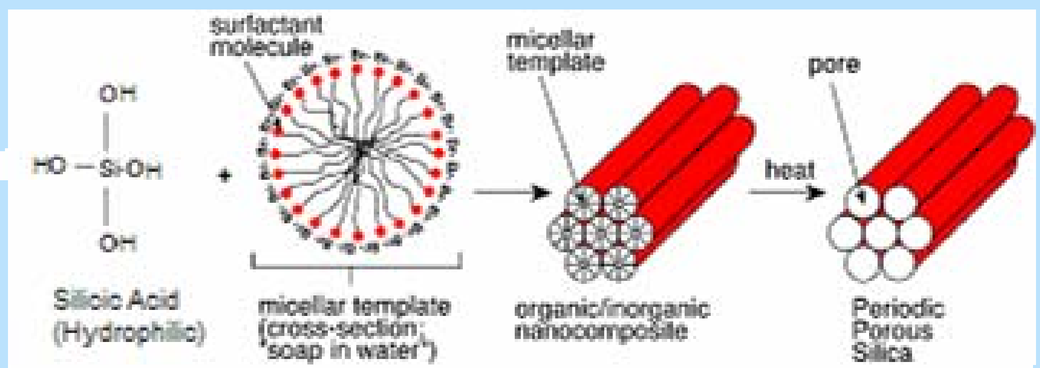
Background:
The use of zerovalent iron for in-situ remediation of chlorinated compounds.
Can nanoscale iron be used more effectively by minimizing aggregation, and
Improving mobility during in-situ remediation?

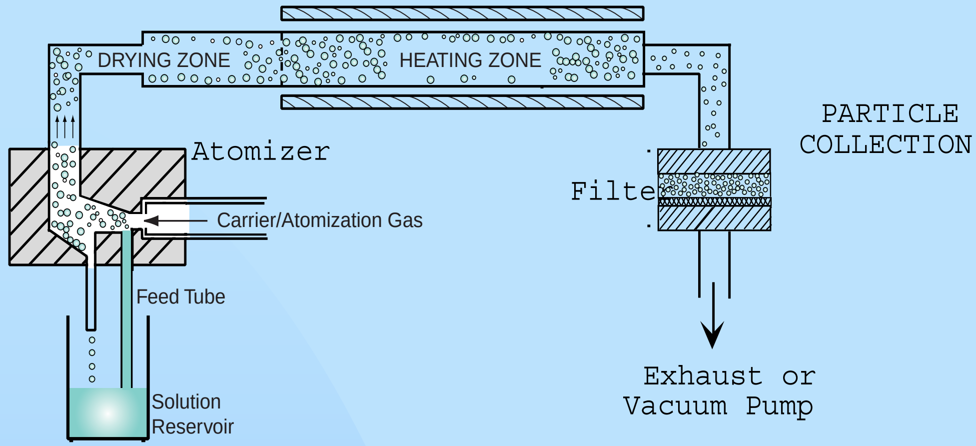
Our **objective** is to design mesoporous supports for nanoscale iron with controlled functionalities to allow catalyst partitioning to the organic/aqueous/ interfacial regions.

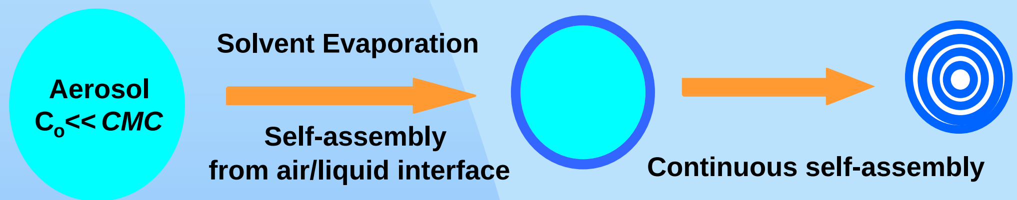
We use the principles of surfactant **self-assembly** to create structured mesoporous supports.

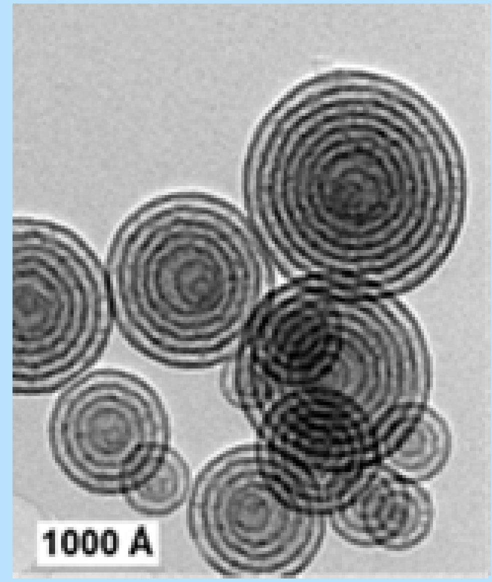




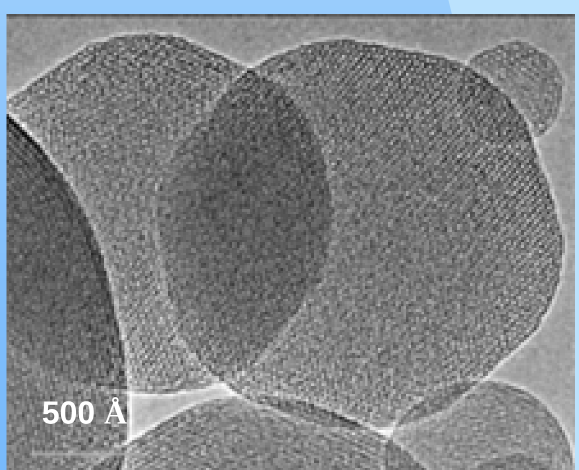
Aerosol Process to Mesostructured Silicas





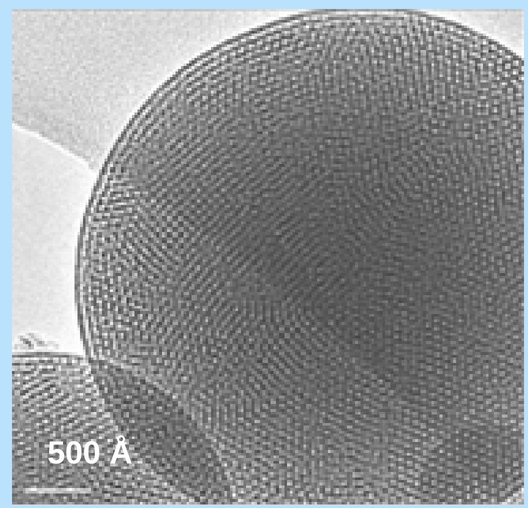


Lamellar

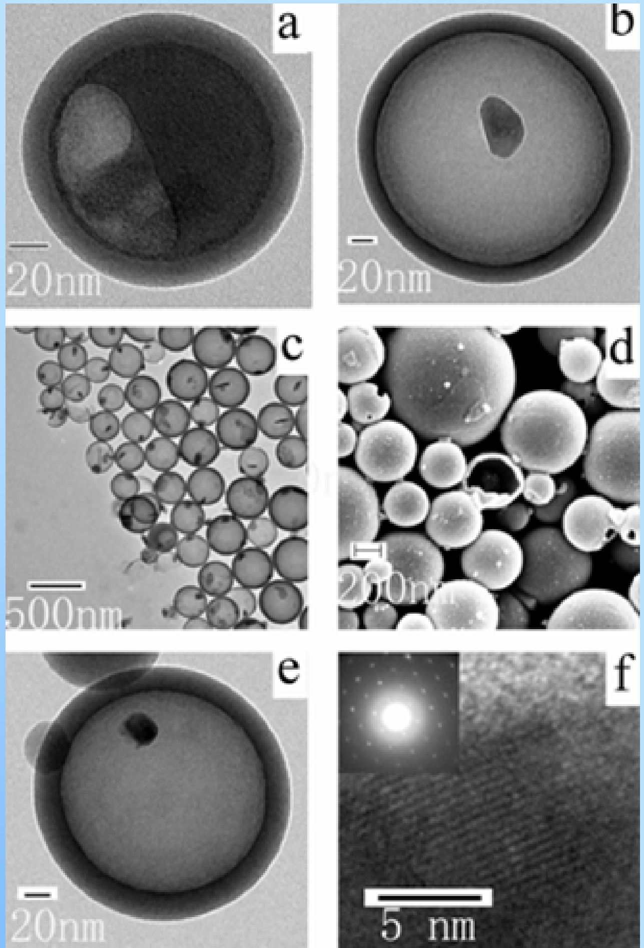


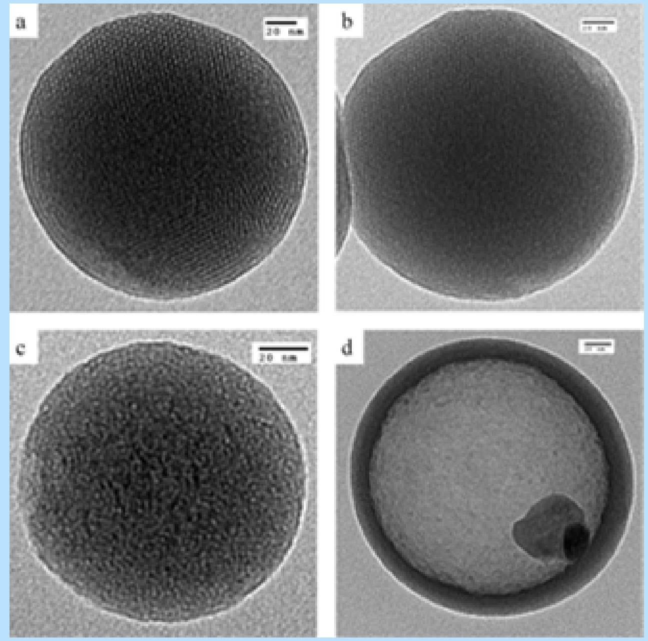
Hexagonal

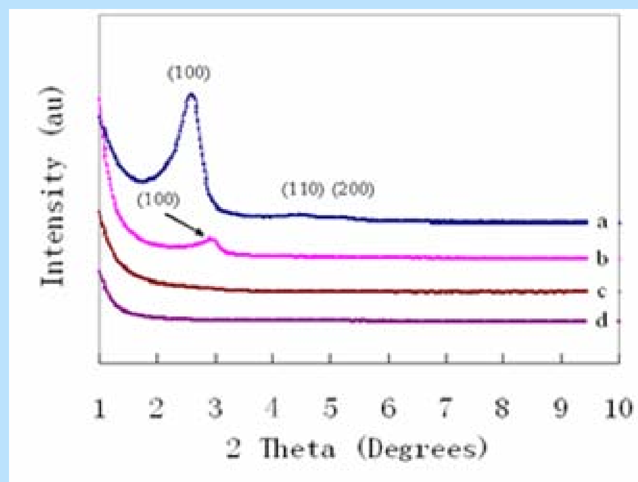
Cubic

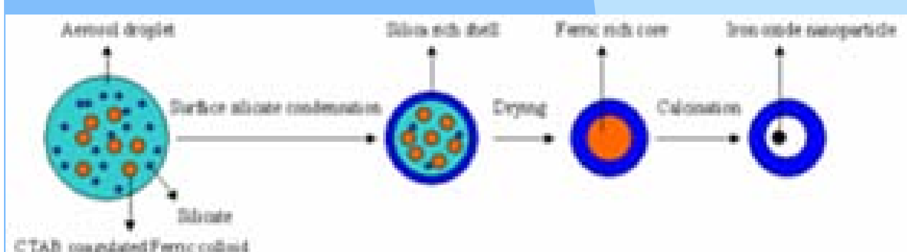


Preliminary Results: Aerosolization with Iron Precursors and generation of hollow silica structures









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Continuing work:

• Generating iron containing silica nanoparticles.

• Functionalizing silicas with hydrophobic/hydrophilic ligands to control zerovalent iron mobility and partitioning characteristics.

• Evaluating activity towards TCE breakdown using static experiments.

• Developing a novel microcapillary video-microscopy based technique to visualize contaminant droplet and catalyst particle characteristics during in-situ remediation.

• Column experiments to measure the efficacy of contaminant breakdown during In-situ remediation.