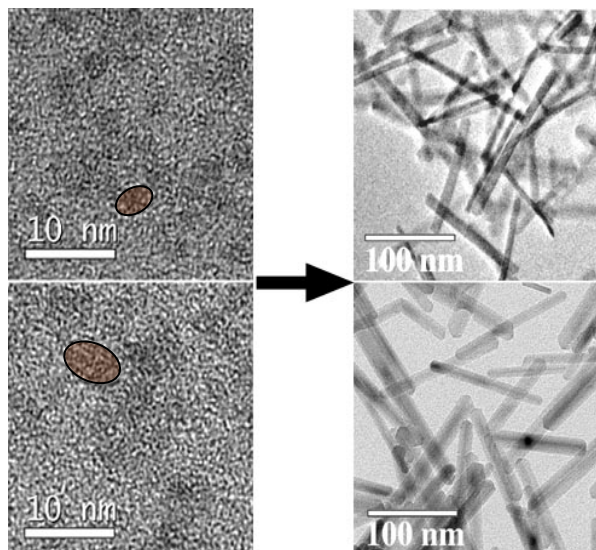


Nanocrystals: Reactivity and Growth Mechanisms

R. Lee Penn (PI), Jasmine J. Erbs, , Thelma S. Berquó, Sandeep Kumar,
Jason Myers, Virany Yuwono, Nathan Burrows
Department of Chemistry, University of Minnesota
NNIN Facility utilized: Characterization Facility

Nanocrystal growth mechanisms

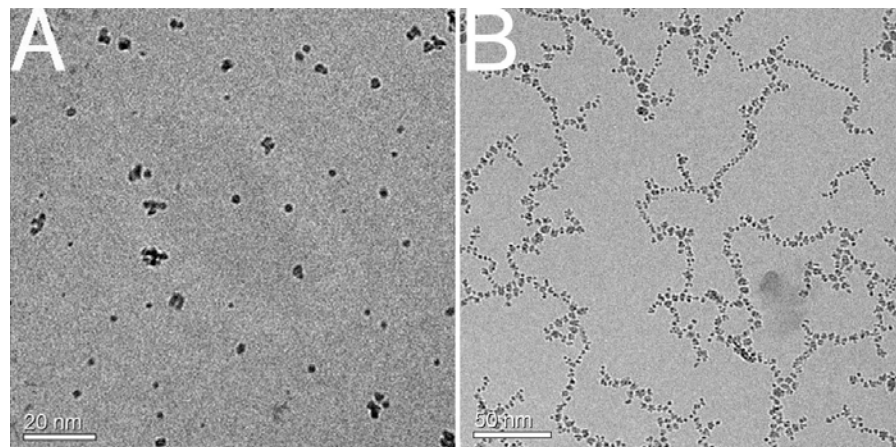
- ◆ Iron oxides
- ◆ Other metal oxides (e.g., ZnO)
- ◆ PbSe
- ◆ Zeolites (in collaboration with the group of M. Tsapatsis)



TEM images of iron oxide nanoparticles (left) and the product oriented aggregate crystals.

Iron oxides grow by oriented aggregation, and nanocrystal size can be controlled.

We use Cryo-TEM to directly observe nanocrystals in the solutions (most commonly, aqueous) in which they grow.



Cryo-TEM images of iron oxide nanoparticles in aqueous solution at time zero (left) and after aging at elevated temperature (right).

Publications: Isley and Penn, MRB (2009); Kumar et al., JACS (2008); Yoo et al., Ang. Chemi Intl.Ed. (2008); Fan et al., Nature Materials (2008); Ratkovich and Penn, MRB (in press); Ratkovich and Penn, J Solid State Chem (2008); Fan et al., Nature Materials (accepted); Yoo et al., Angewandte Chemie (2008); Maheshwari et al., JACS (2008); Isley and Penn, J. Phys. Chem. C (2008)