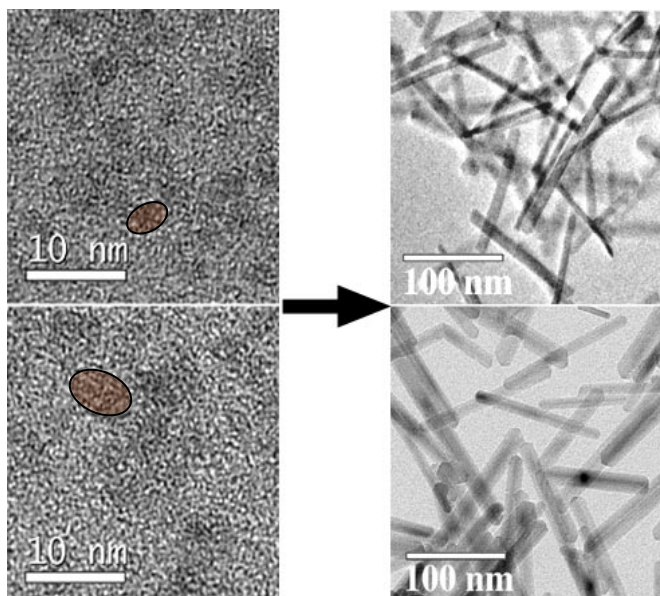


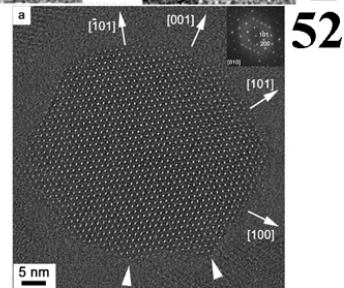
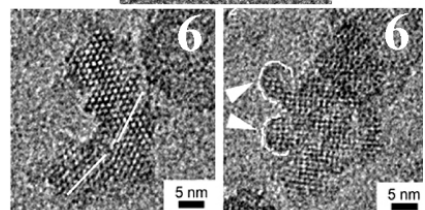
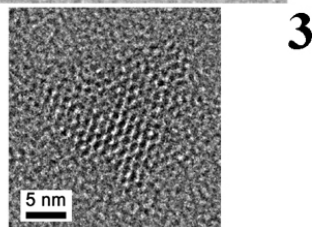
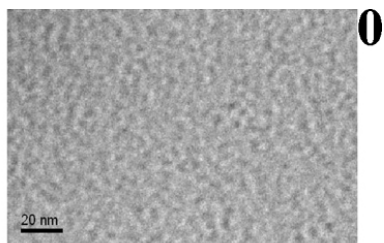
# Nanoparticle Growth Mechanisms

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Chemistry, University of Minnesota  
NNIN Facility utilized: Characterization Facility

We study oriented aggregation, which is a nanoparticle growth mechanism that can be exploited in order to control nanoparticle size and shape. We work with a wide range of materials. Two examples are shown here.



**IRON OXIDES**



**ZEOLITES**

Collaborators in this area:

Profs. Michael Tsapatsis and Alon McCormick, Department of Chemical Engineering and Materials Science.

Profs. Andreas Stein and Marc Hillmyer, Department of Chemistry.

## Publications

- Isley and Penn, J. Phys. Chem. C (in press)
- Isley and Penn, Mat. Res. Bull. (in revision)
- Ratkovich and Penn, J. Phys. Chem. C (2007)
- Penn et al., J. Crystal Growth (2007)
- Myers and Penn, J. Phys. Chem. C (2007)
- Kumar et al., J. Phys. Chem. B (2007)
- Davis et al., Nature Materials (2006)
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- Burleson and Penn, Langmuir (2006)
- Penn et al., J. Crystal Growth (2006)
- Isley et al., Electrochem. Soc. Trans. (2006)
- Penn, J. Phys. Chem. B (2004)