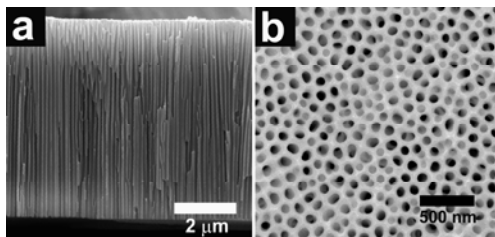


Confinement in Meso Pores- Macromolecular Crystals and Sensors

Opportunity

- Understanding the behavior of macromolecules, polymers, liquids, phase transitions, in confined geometries,
- Develop new functionalities and prepare artificial crystals made out of macromolecules without inter-molecule interactions.



Reproducible Porous Alumina Structures-

- a) Side view
- b) Top view

Meso Challenge

- Size of the confinement becomes comparable to size of macro molecules, diffusion distances, brownian motion distances, curvature of liquid meniscus,
- Understanding the role of disorder, since this may dominate the properties.

References: F. Casanova et al, Nanotech, 19, 315709(2008), S. D. Alvarez et al, Am. Chem. Soc. Nano 3, 3301(2009)

Approach

- Developing; reproducible, well controlled mesoporous structures, optically accessible transparent media, inert materials, etc.
- Modify porous structure, geometry, shape along and perpendicular to pore growth,
- Quantitative structural, & Optical characterization techniques, methods to functionalize internal surfaces,

Impact

- Understanding configuration and dynamics of confined macromolecules, produce artificial crystals from individual macromolecules with tunable geometries,
- Development of sensors for macromolecules, studies of microcapillary condensation, changes in phase transitions due to confinement & applications of external fields.