

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Preparation of Mesoporous Ceramics from Polymer Nanotubes**

DIAN CHEN, SOOJIN PARK, JIUN-TAI CHEN, EMILY REDSTON, THOMAS RUSSELL, University of Massachusetts Amherst — Poly(styrene-*b*-4-vinylpyridine) (PS-*b*-P4VP) nanotubes were prepared by placing polymer solution into the cylindrical nanopores of an anodic aluminum oxide (AAO) membrane. The PS-*b*-P4VP nanotubes within the AAO membranes were exposed to tetrahydrofuran vapor to produce uniform spherical micelles along the tube. The tubes were removed from the membranes, then suspended in ethylene glycol, a preferential solvent for P4VP. At 95°C, near the glass transition temperature ( $T_g$ ) of PS, nanotubes with uniform nanopores were obtained by a reconstruction of the nanotubes. As the temperature was increased, mesoporous polymer structures were obtained. Tetraethyl orthosilicate or titanium tetraethoxide, ceramic precursors, were introduced into the 4VP microdomains. After exposure to an oxygen plasma or high temperature, the copolymer was removed and the precursor converted to a mesoporous ceramic. This process offers a simple route for the fabrication of tunable mesoporous ceramic or metallic structures by changing molecular weight of copolymers.

Dian Chen  
University of Massachusetts Amherst

Date submitted: 18 Nov 2008

Electronic form version 1.4