Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sub-nm porous membrane based on cyclic peptide nanotubes[1] CHEN ZHANG, RAMI HOURANI, CHANGYI LI, University of California at Berkeley, BRETT HELMS, The Molecular Foundry, Lawrence Berkeley National Laboratory, TING XU, University of California at Berkeley — Porous thin films containing subnanometer channels oriented normal to surface exhibit unique transport and separation properties and can serve as selective membranes for different applications. Generating flexible nanoporous films with densely packed vertical channels over large areas remains a significant challenge. We developed a new approach where the growth of cyclic peptide nanotubes can be directed in a structural framework set by the self-assembly of block copolymers. Conjugating polymers to cyclic peptides enables the nanotube subunits be selectively solubilized in one copolymer microdomain. Conjugated polymers mediate nanotube-polymer interaction to guide nanotube growth. This led to subnanometer porous membranes containing high-density arrays of through channels. In parallel, we also studied how to modify the interior of nanotubes with controlled geometry. Artificial amino acid is introduced in the primary sequence of cyclic peptide with a functional group presented in the nanotube interior without disrupting the high aspect ratio nanotubes. The new design of such a cyclic peptide enables one to modulate the nanotube growth process to be compatible with the polymer processing window, hence opening a viable way of fabricating polymeric membranes for different application

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Date submitted: 11 Nov 2011 Electronic form version 1.4