Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Stimuli-Responsive Block Copolymer Nanoporous Template by Magnetic-Field Alignment[1] YOUNGWOO CHOO, MANESH GOPINADHAN, Yale University, PRASHANT DESHMUKH, University of Connecticut, PAWEL MAJEWSKI, Yale University, OLGICA BAKAJIN, Porifera Nano Inc., MENACHEM ELIMELECH, Yale University, RAJESWARI KASI, University of Connecticut, CHINEDUM OSUJI, Yale University — Block copolymers have attracted intense interest related to their potential application as stimuli-responsive nanoporous membranes based on the selective removal of one component of the system, and stimuli-responsiveness of the remaining material. There are however several non-trivial challenges associated with realizing vertically aligned nanopores in stimuli-responsive thin films. Here, we present a facile approach to direct the self-assembled morphology of novel poly(lactide) based brush-block copolymers using a magnetic field. The norbornene backbone of the BCP architecture allows cross-linking of the template while the liquid crystalline majority block provides magnetic anisotropy. *In-situ* temperature resolved small angle x-ray scattering (SAXS) under a 6 T magnetic field revealed that the system self-assembles into highly ordered hexagonally-packed cylinders of PLA and that this aligned structure is maintained after UV cross-linking of the LC matrix and hydrolytic removal of the PLA material. Furthermore, temperature resolved SAXS showed that the nanopores can be reversibly closed and opened multiple times while retaining their alignment by appropriate heating and cooling in the absence of the field.

[1]This work was supported by NSF(CCMI-1246804).

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Date submitted: 15 Nov 2013 Electronic form version 1.4