Abstract Submitted
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**Large area Magnetic alignment of a Cylindrical liquid crystalline Brush Block Copolymer for Generating Nanoporous Templates**[1] MANESH GOPINADHAN, Yale University, PRASHANT DESHMUKH, University of Connecticut, PAWEL MAJEWSKI, Yale University, RAJESWARI KASI, University of Connecticut, CHINEDUM OSUJI, Yale University, OSUJI LAB/KASI'S LAB TEAM — Magnetic fields have been shown to be a facile route to directing the self-assembly of both lamellar and cylinder forming diamagnetic block copolymer nanostructures over macroscopic areas. Here we present magnetic field directed self-assembly of a novel strongly segregated cylindrical block copolymer with polynorbonene backbone bearing a poly(lactic acid) PLA minority cylindrical brush block which is amenable to selective removal by chemical etching while a ciano-biphenyl species forms the liquid crystalline magneto-responsive block. We found that the PLA brush length is critical to obtain hexagonally packed cylindrical domains, while the system was not susceptible to magnetic field alignment due to large separation of LC clearing transition and order-disorder transition temperatures. Surprisingly, doping a small amount of free ciano-biphenyl mesogens induces strong and fast alignment of block copolymer microdomains under 5T magnetic field. Subsequent etching of the PLA block from the aligned material and cross-linking norbonene backbone by thiol-ene chemistry yield highly aligned nanoporous membranes which could potentially serve as templates for the synthesis of nanomaterials. Magnetic field directed self-assembly thus offer a simple route to generate nanoporous templates where porosity and the dimensions can be controlled by the molecular parameters.

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Manesh Gopinadhan
Dept. of Chemical and Environmental Engineering, Yale University

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