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**Liquid Crystalline Block Copolymers with Brush Type Architecture: Toward Functional Membranes by Magnetic Field Alignment**[1]
YOUNGWOO CHOO, MANESH GOPINADHAN, Yale University, LALIT MAHAJAN, RAJESWARI KASI, University of Connecticut, CHINEDUM OSUJI, Yale University — We introduce a novel liquid crystalline block copolymer with brush type architecture for membrane applications by magnetic field directed self-assembly. Ring-opening metathesis of n-alkyloxy cyanobiphenyl and polylactide (PLA) functionalized norbornene monomers provides efficient polymerization yielding low polydispersity block copolymers. The molecular weight of the PLA side chains, spacer length of the cyanobiphenyl mesogens are systematically varied to form well-ordered BCP morphologies at varying volume fractions. Interestingly, the system features morphology dependent anchoring condition where mesogens adopt planar anchoring on cylindrical interface while homeotropic anchoring was preferred on a planar block interface. The minority PLA domains from highly aligned materials can be readily degraded by hydrolysis to produce vertically aligned nanoporous polymer films which exhibit reversible thermal switching behavior. The polymers introduced here provide a versatile platform for scalable fabrication of aligned membranes and further functional materials based on such templates.

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