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Magnetic field directed self-assembly of liquid crystalline block copolymers for membrane applications[1] MANESH GOPINADHAN, PAWEL W. MAJEWSKI, CHINEDUM O. OSUJI, Yale University — The use of magnetic fields is presented as a facile approach to the control of long range order and alignment of block copolymers. Using SAXS we demonstrate the alignment of lamellar and hexagonally packed cylinder morphologies of a poly(ethylene oxide)-based LC diblock copolymer by slow cooling in the presence of the field through the order-disorder transition. Non-degenerate alignment of the lamellar system is enabled by sample rotation and alignment in the system is shown to be driven by the diamagnetic anisotropy of the LC mesogen, and not anisotropy resulting from crystallization of the PEO block. We consider the effects of lithium doping and field strength on the order-disorder transition of the system, and the effect of lithium content on the critical field required for attaining well aligned films. The controlled alignment of PEO channels over large areas offers a route to selective ion transport in solid state batteries.

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