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Magnetic fields-directed self-assembly of soft nanomaterials for energy harvesting and storage[1] PAWEL MAJEWSKI, MANESH GOPINADHAN, CANDICE PELLIGRA, CHINEDUM OSUJI, Yale University — We utilize magnetic fields to impose long range order in self-assembled soft materials including block copolymers, polymer-nanowire composites, and surfactant mesophases. Due to the space-pervasive nature of magnetic fields, this method can be utilized to produce arbitrarily large volumes of highly anisotropic materials with a quality of the alignment frequently approaching that of single crystals as assessed by X-ray scattering. The high fidelity of the alignment allows us to systematically explore and characterize the anisotropy of the charge transport in these materials. We present the results for improving charge transfer in cobalt doped ZnO nanowire-polythiophene composites for photovoltaic applications by the alignment of the nanowires. In block copolymers, we focus on enhancing Li-ion transport in membranes by the alignment of the Li-conducting PEO domains. We compare the magnitude of anisotropy and temperature dependence of ionic conductivity to the data obtained for non-polymeric surfactant-water systems.

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