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**Magnetic fields in long-range alignment of functional hybrid soft materials**[1] PAWEL MAJEWSKI, MANESH GOPINADHAN, CANDICE PELLIGRA, Yale University, SHANJU ZHANG, California Polytechnic State University, LISA PFEFFERLE, CHINEDUM OSUJI, Yale University — We present a magnetic field-based method to impose long range order in self-assembled soft materials including polymer-nanowire composites, block copolymers and surfactant mesophases. We discuss the broad utility of this approach, indicating its advantages and limitations. Our method yields highly anisotropic materials with quality of alignment in many cases comparable to that of single crystals as assessed by X-ray scattering techniques. We take advantage of the high fidelity of alignment to systematically explore and characterize the anisotropic properties of these materials. We present a perspective for improving electron and hole transport, as well as exciton utilization in magnetically doped ZnO nanowire-polythiophene composites for photovoltaic applications by global alignment of the nanowires. For block copolymers, we focus on enhancing Li-ion transport in membranes with self-assembled cylindrical and lamellar morphology by alignment of the Li-conducting PEO domains.

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