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Magnetically aligned polymers and nanocomposites for energy harvesting and energy storage applications[1] PAWEL MAJEWSKI, MANESH GOPINADHAN, CANDICE PELLIGRA, Yale University, SHANJU ZHANG, California Polytechnic State University, LISA PFEFFERLE, Yale University, LUIS CAMPOS, Columbia University, CHINEDUM OSUJI, Yale University — The realization of anisotropic, nanostructured, functional materials by self-assembly is impaired by the persistence of structural defects which render the properties of the system isotropic on macroscopic length scales. We present three distinct systems including ZnO nanowire-semiconducting polymer composites, Li-ion conducting block copolymer membranes, and perylene-based block copolymers where self-assembly under a magnetic field yields alignment and global anisotropy of their physical properties. The resulting aligned nanostructured systems are attractive for ordered heterojunction photovoltaics, high performance solid polymer electrolyte membranes and electro-optical devices, respectively. Our results demonstrate that magnetic fields offer a viable route for directing the self-assembly of certain soft functional materials. The ready scalability of this approach makes it potentially important from a technological standpoint.

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