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Organization of Magnetic Nanowires via Elastic Forces in a Periodic Multi-Domain Nematic Liquid Crystal[1] CLAYTON LAPOINTE, DANIEL REICH, ROBERT LEHENY, Johns Hopkins University — An anisotropic particle suspended in a thermotropic nematic liquid crystal imposes an elastic energy cost on the nematic that depends on the orientation of the particle relative to the nematic director. In a nematic with a spatially varying director field, such a particle can hence experience translational forces that depend on its orientation. We report experiments in which we exploit these forces to organize ferromagnetic Ni nanowires suspended in the nematic 4-pentyl-4-cyanobiphenyl (5CB). Using lithographic techniques to pattern the nematic anchoring conditions on substrates, we generate periodic multi-domain nematic environments for the wires. With their orientation controlled by a small external magnetic field, the wires sediment to preferred domains to minimize elastic energy.

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