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Topological Transformation of Defects in Nematic Liquid Crystals[1] ZACHARY PAGEL, TIMOTHY ATHERTON, JEFFREY GUASTO, PEGGY CEBE, Tufts Univ — A topological transformation around silica microsphere inclusions in nematic liquid crystal cells (LCC) is experimentally studied. Silica microspheres are coated to induce homeotropic LC anchoring to the spheres. Parallel rub directions of the alignment polymer during LCC construction create a splay wall that traps the microspheres. Application of an out-of-plane electric field then permits a transformation of hedgehog defects, reversing the orientation of the defect around microspheres. The transformation controllably reverses the microsphere's direction of travel during AC electrophoresis due to defect-dependent velocity anisotropy. A similar transformation is studied on chains of microspheres with hedgehog defects, where the defect orientation is reversed on the entire chain. Polarized and confocal microscopies are used to study the defect structures. Results contribute to recent developments in microsphere electrokinetics in nematic LCs, as the transformation adds an additional degree of control in the electrophoretic motion of microspheres and chains of microspheres with dipolar defects.

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