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TopologicallyRequired Defects in Nematic Liquid Films over Microposts or in contact with Anisotropic Particles

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In this work we present an experimental investigation of topological defects in nematic liquid crystals formed over micropost array with a LC-air interface pinning to the pillar edges or containing washer-shaped microparticles in suspension. For nematic-LC covered microposts with homeotropic anchoring conditions on all boundaries, including the LC-air and LC-substrate interfaces, disclination lines form that bear the signature of the micropost and satisfy global topological constraints of the system. When washer particles with different anchoring conditions are dispersed in homeotropic liquid crystal cells, new topological configurations are observed. In each case, defects are described from both a geometric and topological perspective. Finally, we demonstrate that topological defects created by microposts and washers can generate elastic interactions with dispersed microparticles in nematic liquid crystals. We believe this is a promising route to controlling colloidal self-assembly in complex media.