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Topological defects in liquid crystals as templates for molecular self-assembly. XIAOGUANG WANG, DANIEL MILLER, EMRE BUKUSOGLU, University of Wisconsin-Madison, JUAN DE PABLO, University of Chicago, NICHOLAS ABBOTT, University of Wisconsin-Madison — Topological defects in liquid crystals (LCs) have been widely used to organize colloidal dispersions and template polymerizations, leading to a range of elastomers and gels with complex mechanical and optical properties. However, little is understood about molecular-level assembly processes within defects. This presentation will describe an experimental study that reveals that nanoscopic environments defined by LC defects can selectively trigger processes of molecular self-assembly. By using fluorescence microscopy, cryogenic transmission electron microscopy and super-resolution optical microscopy, key signatures of molecular self-assembly of amphiphilic molecules in topological defects are observed - including cooperativity, reversibility, and controlled growth of the molecular assemblies. By using polymerizable amphiphiles, we also demonstrate preservation of molecular assemblies templated by defects, including nanoscopic o-rings synthesized from Saturn-ring disclinations. Our results reveal that topological defects in LCs are a versatile class of three-dimensional, dynamic and reconfigurable templates can direct processes of molecular self-assembly in a manner that is strongly analogous to other classes of macromolecular templates.

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