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Directed self-assembly of colloidal particles onto the chemically anchoring patterned surface in a nematic liquid crystal XIAO LI, JULIO ARMAS-PÉREZ, JUAN HERNANDEZ-ORTIZ, JUAN DE PABLO, PAUL NEALEY, University of Chicago — The defects assisted assembly of colloidal particles works are more focused on the defects created in the bulk or the interface of nematic liquid crystal, which usually observe a group of particles spontaneously forming a chain or aggregating over the defects. The confining surface with specific 3D sculptured structures, such as pyramid or zig-zag grooves, offers the opportunity to isolate the trapped particles into certain position. Here, we explore a new method to direct self-assemble the colloidal particles through manipulating defects on the 2D geometry confined anchoring surface. Since the director of the preferred planar orientation of LCs could be manipulated by the pattern geometry and dimension, the topological defects could be engineered based on multi-stable orientation by designed 2D geometry pattern of different controllable direction at sub-micrometer dimension. We demonstrate that the designed one single middle straight stripe with disjoint two groups of straight stripe array on both side of the middle stripe as 45 angle of different orientation director could control the distortion of the disjoint gap space thus acting as defects template to trap the colloidal particles directed self-assembly at the designed positions. Through anchoring distribution on the pattern areas, geometry design of pattern, and also the external electric field applied on the system, those defects areas could be generate, erase, resume or even correct.

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