

Abstract Submitted
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Blue-Phases on Nano-Patterned Surfaces¹ JOSE MARTINEZ-GONZALEZ, XIAO LI, MONIRO SADAT, YE ZHOU, RUI ZHANG, PAUL NEALEY, JUAN DE PABLO, Univ of Chicago — Blue-phases are states of matter with liquid properties and cubic crystalline structures of topological defects. Usually, a sample of this complex fluid consists of randomly oriented polycrystalline domains; this deteriorates the electro-optical properties of the material and places limits to its potential applications. In this work a theoretical analysis of channel-confined blue-phases was used to identify the preferred local molecular orientation at different crystallographic planes. This led to different template designs for surface patterning that were used to direct the lattice orientation of blue-phases with respect to the channel surface. Our theoretical predictions were confirmed through experiments with nano-patterns accurately produced on chemical surfaces. This provides a new methodology to produce monocrystalline blue-phase domains as large as the patterned area with a desired lattice orientation. Our findings open the possibility to fully exploit the crystalline features of blue phases, which are useful for the design of a new generation of biological sensors, photonics materials and liquid crystal displays.

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