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**Lithographic use of highly ordered toric focal conic domain (TFCD) in confined system** YUN HO KIM, DONG KI YOON, KAIST, HYEON SU JEONG, JUNG HYUN KIM, EUN KYUNG YOON, HEE-TAE JUNG, KAIST — Large area ordered structure by organic molecular soft building blocks is one of the most exciting interdisciplinary research areas in current materials science<sup>1</sup> and nanotechnology. To date, several distinct organic building blocks—including colloids, block copolymers and surfactants— have been examined as potential materials for the creation of lithographic templates. Here we report that perfect ordered-arrays of toric focal conic domains (TFCDs) covering large areas can form by semi-fluorinated smectic liquid crystals (LCs). Combined with controlled geometry, i.e. microchannel, our smectic LC system exhibits high density of TFCDs that are arranged with remarkably high regularity. Direct visualization of the internal structure of TFCDs clearly verified that the smectic layers were aligned normal to the side walls and parallel to the top surface, and merge with the circular profile on the bottom wall surface. Moreover, we demonstrate the new concept of smectic LC lithography technique. Grown in microchannels from a mixture of LC molecules and fluorescent particles, TFCDs of the smectic LCs acted as a template, trapping particles in an ordered array. In addition to, the uniform radial director field of smectic LC molecule in TFCD is used as microlens for photolithographic process. The present findings pose new theoretical challenges and potentially open the way for lithographic applications based on smectic liquid crystalline materials.

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