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Memory effects of nematic liquid crystals in porous network: the role of geometry[1] FRANCESCA SERRA[2], University of Milan, SHANE EATON, Polytechnic University of Milan, MARCO BUSCAGLIA, ROBERTO CERBINO, University of Milan, GIULIO CERULLO, ROBERTO OSELLAME, Polytechnic University of Milan, TOMMASO BELLINI, University of Milan — We exploit here the bistability of nematic liquid crystals (NLC) induced by their confinement into bicontinuous porous networks. In such a confined liquid crystal, the application of a strong external field induces the reconfiguring of topological defects, which then become locked as they entangle with the porous material. In this sense, the system has a memory of the applied field and it retains its orientation also when the field is removed. Computer simulations already showed that this effect depends on the geometry and the topology of the porous material. Incorporating liquid crystals in laser-microfabricated structures, made with two-photon polymerization, allows us to experimentally test this concept. We compare networks with different geometry and measure the memory of liquid crystals: we show that, as computer simulations predict, the cubic geometry yields the biggest memory effect. Both experiments and simulations also show that defects and anisotropies in the porous structure are important parameters that can substantially affect the memory. The small size of the scaffold (50-100 microns) and the large memory of the liquid crystals in cubic scaffold make this system promising for applications.

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