Stimuli-Responsive Polymer Architectures as Optical Sensing Materials and Smart Membranes

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In the last decade stimuli-responsive polymers attracted enormous attention for a range of important applications.[1,2] Such polymers are capable of changing their conformation, solubility, or they can even break or form covalent bonds upon a change of temperature or pH value, upon light irradiation, by using electrochemical stimuli or by the presence of an electrical or magnetic field, or by combinations thereof.[3-6] The presentation will focus on polymer materials, which contain at least one selectively addressable segment, either chemically or physically. Functional porous nanostructures obtained by block copolymer self-assembly as well as recent advances in inverse opal films prepared by using the so-called melt-shear organization technique will be highlighted and discussed in more detail.[7,8] In the case of soft colloidal crystal and inverted structures, which are also referred to as *polymeric opals*, external triggers additionally lead to a remarkably fast and reversible change of their intriguing optical properties, which could be easily processed to films or 3D printed complex objects (Fig. 1).[9] A major benefit of self-assembled polymeric materials is their inexpensive and convenient preparation giving a good optical performance. The talk will give some recent advances for the rational design of functional porous materials with hierarchical architectures also in combination with sustainable cellulose-based materials. Herein presented preparation strategies will pave the way to a manifold of applications in the field of sensing and smart membrane technologies.

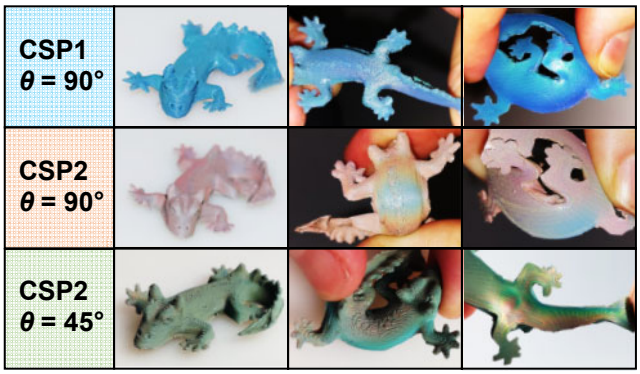

Figure 1. Mechano-responsiveness of 3D printed opal structures.

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