

## **Supplementary Information**

# **Buckling, symmetry breaking, and creasing in periodically microstructured hydrogel membranes**

Gaoxiang Wu, Yu Xia and Shu Yang

Department of Materials Science & Engineering, University of Pennsylvania, 3232 Walnut  
Street, Philadelphia, PA 19104, USA

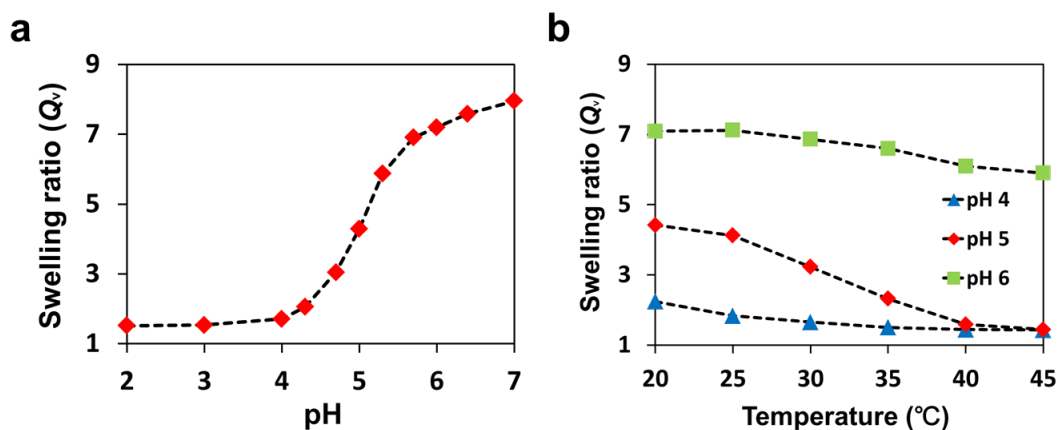


Figure S1. (a) The volumetric swelling ratio of the poly(2-hydroxyethyl methacrylate-*co*-*N*-isopropylacrylamide-*co*-acrylic acid) (43.7:40.8:14.5 mol%) bulk hydrogel in buffer solutions of different pH values at room temperature (25°C). (b) The volumetric swelling ratio of the hydrogel vs. the temperature at pH 4, 5, and 6, respectively.

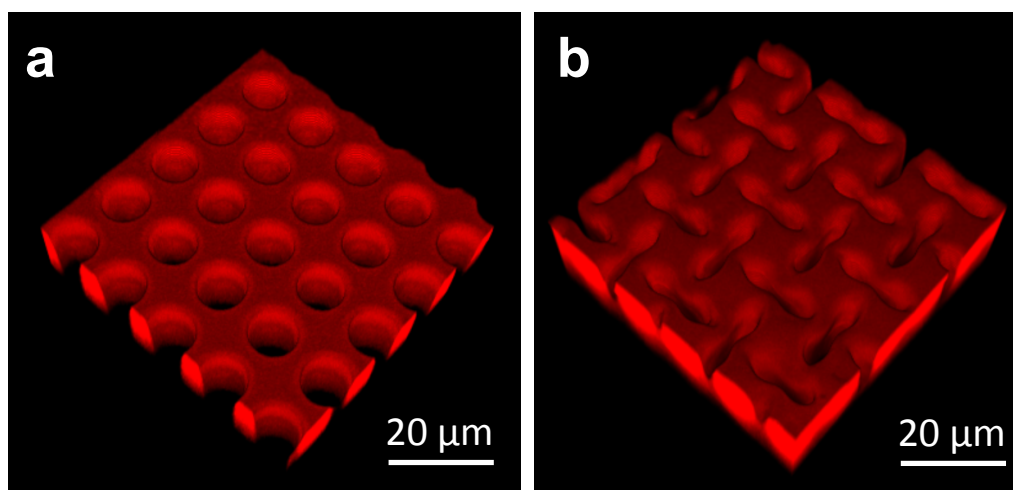


Figure S2. The 3-D reconstruction confocal images of the hydrogel membrane at pH 2 (a) and pH 4 (b).

**Movie S1.** Recovery of the hydrogel membrane from the twisted chiral structure to circular pore array by heating the sample from 25 °C to 45 °C. The movie is ten times faster than the actual process.

**Movie S2.** Triggering of the buckling instability to symmetry breaking in the hydrogel membrane via cooling the film from 45 °C to 25 °C. The movie is ten times faster than the actual process.