

Abstract Submitted  
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**Swelling/deswelling of Toroidal Hydrogels** YA-WEN CHANG, MICHAEL DIMITRIYEV, Georgia Institute of Technology, SAMANTHA MARQUEZ, Maggie L. Walker Governor's School for Government and International Studies, PAUL GOLDBART, ALBERTO FERNANDEZ-NIEVES, Georgia Institute of Technology — Swelling/deswelling of hydrogel spheres proceeds with the increase/decrease of particle radius that corresponds to the change in overall volume. When the hydrogel has a toroidal geometry, which is characterized by two principal radii –radius from the center of the donut hole to the center of the tube, and the tube radius, it is not obvious how swelling proceeds. We prepare thermo-sensitive poly(N-isopropylacrylamide) pNIPAM toroidal gel particles of different aspect ratios. At equilibrium deswelling, i.e., slow heating rate, we find that the aspect ratio remains constant for both fat and thin tori. This is explained by linear elasticity. On the other hand, when the heating rate is sufficiently high, the toroid buckles due to the presence of a water-impermeable skin layer that develops in the initial deswelling stages.

Ya-Wen Chang  
Georgia Institute of Technology

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