Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Modeling the rapid de-swelling of toroidal hydrogels[1] SVETOSLAV NIKOLOV, YA-WEN CHANG, ALEXANDER ALEXEEV, ALBERTO FERNANDEZ DE LAS NIEVES, Georgia Institute of Technology — The utilization of synthetic hydrogel networks as 3-D cell culture platforms has allowed researchers to more effectively study how epigenetic factors affect cell growth and physiology. As a whole, this has emphasized the biomechanical role of scaffold structures and led to a number of advances in tissue engineering. Our current research focuses on modeling temperature activated shape transformations of toroidal poly(N-isopropylacrylamide) pNIPAM gels. We use dissipative particle dynamics (DPD) to simulate the steady (slow heating rates) and unsteady (fast heating rates) de-swelling behavior of these thermo-sensitive gels. Our simulations show that for slow heating rates the aspect ratio of the tori remains constant during de-swelling. For rapid heating rates we observe buckling instabilities. Our simulations agree with the experimental observations.

[1]Financial support by NSF CAREER Award DMR-1255288 is gratefully acknowledged.

Svetoslav Nikolov
Georgia Institute of Technology

Date submitted: 14 Nov 2014 Electronic form version 1.4