Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Robust thermosensitive colloidal photonic crystals JIN-GYU PARK, WILLIAM ROGERS, SOFIA MAGKIRIADOU, YOUNG-SEOK KIM, VINOTHAN MANOHARAN, Harvard University, HARVARD UNIVERSITY TEAM, KOREA ELECTRONICS TECHNOLOGY INSTITUTE COLLABORATION — Photonic structures made of colloidal nanoparticles that show dynamic switching have tremendous potential applications including tunable lasers, biological/chemical sensors, and optical devices. As a building block, hydrogel nanoparticles made of poly(N-isopropylacrylamide)(pNiPAm) are particularly interesting due to their tunability in size with response to temperature. Uses of pNiPAm as a 3-dimensional building block in colloidal arrays, however, are strictly limited because the structures are easily destroyed by increased thermal fluctuations around their volume phase transition temperature. Here we demonstrate a simple and robust way to assemble photonic crystals made of soft pNiPAm colloidal particles. Our particles consist of a polystyrene core and transparent p(NiPAm-co-Acrylic acid) shell. The scattering is therefore dominated by the polystyrene core, yet the inter-scatterer distance is tunable with temperature change. We use depletion attraction to assemble the colloidal particles into 3D photonic crystals. The resulting structures show dynamic modulations of stop-bands from 24C to 70C without losing the structural features.

Jin-Gyu Park
Harvard University

Date submitted: 20 Nov 2012 Electronic form version 1.4