Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

On the Absence of Red Structural Color in Colloidal Glasses
SOFIA MAGKIRIADOU, Department of Physics, Harvard University, Cambridge, MA, USA, JIN-GYU PARK, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA, YOUNG-SEOK KIM, Korea Electronics Technology Institute, S.Korea, GI-RA YI, Department of Polymer Science and Engineering, Sungkyunkwan University, Suwon, Gyunggi 440-746, S.Korea, VINOTHAN N. MANOHARAN, School of Engineering and Applied Sciences, Harvard University, Cambridge, MA, USA — When a colloidal glass is illuminated, the short-ranged spatial correlations between neighboring particles can give rise to constructive interference for a particular wavelength. Unlike the structural colors arising from Bragg diffraction in colloidal crystals, the colors of these colloidal glasses are independent of angle due to the disordered, isotropic microstructure. We therefore call them "photonic glasses." A similar coloration mechanism is found in the feathers of certain birds. However, there are few examples of red photonic glasses either in nature or in colloidal systems. Using scattering theory, we show that the absence of red photonic glasses can be explained by the wavelength-dependence of the single-particle scattering cross-section, which can override the interference condition set by the structure. We propose ways to overcome this obstacle, and we report on experimental methods to make non-iridescent, structural red color.

Sofia Magkiriadou
Department of Physics, Harvard University, Cambridge, MA, USA

Date submitted: 17 Nov 2012 Electronic form version 1.4