Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

In-situ USAXS/SAXS Investigation of Tunable Structural Color in Amorphous Photonic Crystals During Electrophoretic Deposition[1]

SCOTT BUKOSKY, UC Davis/Lawrence Livermore National Lab, JOSHUA HAMMONS, JINKYU HAN, MEGAN FREYMAN, ELAINE LEE, CAITLYN COOK, JOSHUA KUNTZ, MARCUS WORSLEY, THOMAS YONG HAN, Lawrence Livermore National Lab, WILLIAM RISTENPART, UC Davis, ANDREW PASCALL, Lawrence Livermore National Lab — Amorphous photonic crystals (APCs) formed via electrophoretic deposition (EPD) exhibit non-iridescent, angle-independent, structural colors believed to arise from changes in the particle-particle interactions and inter-particle spacing, representing a potential new paradigm for display technologies. However, particle dynamics on nanometer length scales that govern the displayed color, crystallinity, and other characteristics of the photonic structures, are not well understood. In this work, in-situ USAXS/SAXS studies of three-dimensional colloidal particle arrays were performed in order to identify their structural response to applied external electric fields. These results were compared to simultaneously acquired UV-Vis spectra to tie the overall electrically induced structure of the APCs directly to the observed changes in visible color. The structural evolution of the APCs provides new information regarding the correlation between nano-scale particle-particle interactions and the corresponding optical response.

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344. LLNL-ABS-736068.

Scott Bukosky
UC Davis/Lawrence Livermore National Lab

Date submitted: 03 Aug 2017 Electronic form version 1.4