

Abstract Submitted  
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**Experimental Investigation of Crystalline Structure of Synthetic Opals Using Light Scattering and Diffraction Methods** LILIANA RUIZ DIAZ, University of Texas at Brownsville, AINUR KOSHKIN-BAYEVA, Nazarbayev University, MALIK RAKHMANOV, University of Texas at Brownsville, ANVAR ZAKHIDOV, Alan G. MacDiarmid NanoTech Institute, University of Texas at Dallas — Synthetic opals are 3-dimensional photonic crystals made of mono-dispersed nano spheres fabricated with self-assembly techniques. Such opals usually consist of multiple domains of roughly homogenous regions which are randomly oriented with respect each other. We analyze the crystalline structure of individual domains in opals with diffraction measurements. The diffraction patterns were produced by focusing broadband white light onto a single domain which scattered the reflected light on a screen. We observed strong spatial dispersion in the scattered field which we analyzed using a semi-analytical model. The model allows us to include arbitrary crystalline lattices and introduce point, line, and plane defects in the domains. These experiments give us information about the structure of the opal, orientation of its domains, and presence of the crystalline defects.

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