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Development of High Refractive Index Conjugated Materials MATTHEW GRAHAM, The University of Akron, SHI JIN, CUNY: Staten Island, STEPHEN Z. D. CHENG, The University of Akron — The goal of this project is to fabricate a polymeric material with a complete 3-D PBG, to bring the tailorable physical, electrical, and optical properties of polymeric materials to 3-D PBG materials. Because of its conjugated nature and the presence of a heavy sulfur atom in its repeat unit, poly(thiophene) (PT) is predicted to have one of the highest polymeric refractive indices, but the reported n values for PT are 1.4 at 633 nm. This discrepancy is because the potential needed to electrosynthesize PT, the only method available to synthesize thick and high quality PT films, is higher than its degradation potential. It was found that by polymerizing thiophene with an optimized monomer concentration, proton trap concentration, and reaction temperature in a strong aprotic Lewis acid solvent, the polymerization potential could be reduced below the degradation potential of PT. The resultant PT film had a significantly elevated n Photonic templates were then constructed using a combination of Colvin's methodwith monodisperse spheres and mechanical annealing. High n PT was used to infiltrate the templates, and the templates were removed leaving a polymeric inverse opal with the possibility of a complete 3-D PBG.

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