

Abstract Submitted
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High Refractive Index Poly(thiophene) for Organic 3-D Photonic Crystals with a Complete Photonic Band Gap¹ MATTHEW J. GRAHAM, The University of Akron, SHI JIN, CUNY, Staten Island, FRANK W. HARRIS, University of Akron, STEPHEN Z.D. CHENG, The University of Akron — Photonic crystals (PC) with a complete 3-D photonic band gap (PBG) require materials with sufficient refractive index (n) contrast to be in specific 3-D periodic structures on the length scale of light. Currently, only inorganics have an adequate n to open a complete 3-D PBG. Poly(thiophene) (PT), a sulfur containing conjugated polymer, is predicted to have a sufficient n , but this has not been realized. By optimizing the electropolymerization of PT including reaction rates, temperatures, additives, and reactant concentrations, high quality PT films with an adequately high n can be synthesized. Using a density differential colloidal crystallization technique, which allows the crystallization process to approach thermodynamic equilibrium, high quality templates were produced. A nano-mechanical annealing technique was developed to enable the further perfection of the entropy driven structures. The next step is to combine these to fabricate an organic 3-D PC with a complete PBG.

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