

Abstract Submitted
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Synthesis and Solid State Charge Transport in Radical Polymers

LIZBETH ROSTRO, ADITYA BARADWAJ, BRYAN BOUDOURIS, Purdue University — Conducting polymers have been studied extensively for their applicability in a wide range of electronic devices. Previously, π -conjugated polymers have dominated the research focus due to the high degree of electronic delocalization associated with their molecular structure; however many challenges continue to prevent their viability in consumer applications. Here, we report on an emerging class of transparent non-conjugated conducting polymers, radical polymers, which circumvent many of the challenges faced by π -conjugated polymers. Specifically, a model radical polymer, poly(2,2,6,6-tetramethylpiperidinyloxy methacrylate) (PTMA), was synthesized in a controlled manner using the RAFT polymerization mechanism, which produced polymers with readily-tunable molecular weights and narrow molecular weight distributions. Additionally, the solid state charge transport (*i.e.*, conductivity) was characterized in radical polymers. Furthermore, we demonstrate that the chemistries of the radical polymer functionalities can be tuned readily, and this tuning leads to critical changes in the charge transport ability of these types of macromolecules in the solid state; this tunability allows the materials to be used in high-performing photovoltaic and thermoelectric devices.

Lizabeth Rostro
Purdue University

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