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Quantifying the Solid State Charge Transport Characteristics of Radical Polymers ADITYA BARADWAJ, LIZBETH ROSTRO, BRYAN BOUDOURIS, Purdue University — Radical polymers are an emerging class of functional macromolecules that have shown immense potential to transport charge in electrolyte-supported applications. However, quantifying the ability of these non-conjugated macromolecules to conduct charge has not been as well-studied in the solid state. Here, we present the characterization of the charge transport capability of a radical polymer, poly(2,2,6,6-tetramethylpiperidinyloxy methacrylate) (PTMA) with well-defined molecular properties in the solid state. We show that charge transport occurs across the singularly occupied molecular orbital (SOMO) level of PTMA, and that this level is 5.2 eV removed from free vacuum. Additionally, we have measured the space-charge limited hole and electron mobility values of PTMA. We find that the mobility values of these radical polymers are of the same order (10^{-4} cm^2 V^{-1} s^{-1}) of many common conjugated polymers [*e.g.*, poly(3-hexylthiophene) (P3HT)]. Furthermore, because the polymer backbone is non-conjugated, these macromolecules are extremely transparent. As such, we anticipate that radical polymers could become an important component of many transparent flexible electronic applications.

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