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Free carrier lifetime determination using time-resolved microwave conductivity: methods and implications for devices STEFAN OOSTERHOUT, ZBYSLAW OWCZARCZYK, WADE BRAUNECKER, NIKOS KOPIDAKIS, ROSS LARSEN, DAVID GINLEY, DANA OLSON, National Renewable Energy Laboratory — Optimizing devices for high performance is a time consuming, tedious task. Many polymers that have been synthesized over the last decade, have been employed in devices and proved to have a low power conversion efficiency only after a tedious device optimization experiment. A good free carrier lifetime in polymer organic photovoltaic devices is essential for decent device performance. This characteristic of polymer donor and fullerene acceptor bulk heterojunctions can be determined prior to device fabrication using the contactless time-resolved microwave conductivity (TRMC), eliminating the need for time-consuming device optimization experiments when the free carrier lifetime is low. This presentation focuses on how TRMC is utilized for screening potential new materials for OPV, and methods for a figure-of-merit for charge carrier lifetime is discussed.

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