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Spin Coherence of Polarons in Organic Semiconductors WILLIAM BAKER, DANE MCCAMEY, KIPP VAN SCHOOTEN, SANG-YUN LEE, SEO-YOUNG PAIK, JOHN LUPTON, CHRISTOPH BOEHME, University of Utah —
Organic semiconductors such as MEH-PPV are carbon based conjugated polymers and, as a result of their low nuclei mass, charge carriers within these materials have very small spin-orbit coupling. With this absence of spin-orbit coupling, strong spin selection rules are imposed on their optical and electrical transitions. As these materials are being utilized for light harvesting and device applications, the nature of the spin-dependent transitions is of significant interest. In this talk I will discuss the details of a novel magnetic resonance technique that is sensitive to these spin-dependent transitions, namely pulsed electrically detected magnetic resonance. We show that, with the application of spin-resonant magnetic field pulses, the device current can be modulated by the spin-Rabi nutation of charge carrier pairs between triplet and singlet configurations in both solar cell and light emitting diodes. With this tool we can address questions regarding efficiency, spin coherence times, recombination and generation rates, all of which are paramount to understanding the overall effectiveness of these unique materials.

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