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Measurement of hyperfine fields and the Δg-effect in π-conjugated polymer-based OLEDs using multi-frequency electrically detected magnetic resonance GAJADHAR JOSHI, HANS MALISSA, RICHARD MILLER, LILLIE OGDEN, DOUGLAS BAIRD, SHIRIN JAMALI, MARZIEH KAVAND, KAPIL AMBAL, Univ of Utah, JOHAN VAN TOL, NHMFL FSU, JOHN LUPTON, Universitaet Regensburg, CHRISTOPH BOEHME, Univ of Utah — Magneto-opto-electronic properties of organic semiconductors, such as organic magnetoresistance or magneto-electroluminescence, are strongly influenced by the interplay of proton induced hyperfine fields to which charge carrier spins are coupled [Nguyen et al., Nat. Mater. 9, 345-352 (2010), McCamey et al. Phys. Rev. Lett. 104, 017601 (2010)]. In addition, the weak but non-negligible and highly inhomogeneously distributed spin-orbit effects caused by the material's structural disorder can affect spin-dependent processes. In order to quantitatively access and discriminate between these mechanisms, we investigate the inhomogeneous broadening of polaron spin-resonances using electrically detected magnetic resonance (EDMR) spectroscopy at various magnetic fields between 3mT and 12T. While random local hyperfine fields cause an external magnetic field-independent line broadening, spin-orbit contributions give rise to a distribution of the charge carrier g-factors. This Δg effect leads to a resonance line-width contribution that is proportional to the external magnetic field. We observe an EDMR line that is largely field-independent in the low-magnetic field, but shows substantial broadening of line shape at higher fields.

Gajadhar Joshi
Univ of Utah

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