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Optically Detected Magnetic Resonance (ODMR) Studies Critical to the Determination of the Yield of Singlet Excitons in Fluorescence-Based OLEDs JOSEPH SHINAR, Iowa State University — Recent ODMR studies, including (1) photoluminescence (PL)-detected magnetic resonance (PLDMR) of small π-conjugated molecules, (2) electroluminescence (EL)- and electrically-detected magnetic resonance (ELDMR and EDMR, respectively) studies of small molecular OLEDs, (3) double modulation-PLDMR studies of π-conjugated polymers, and (4) joint PLDMR and thermally stimulated luminescence (TSL) studies of π-conjugated polymers are reviewed. The results of each of these studies are inconsistent with the model in which the positive spin 1/2 (polaron) resonance is due to enhanced delayed PL from nongeminate polaron recombination ("the delayed PL model"). Since the delayed PL model is the basis for the previous ODMR studies which predicted the yield of singlet excitons (SEs) in OLEDs, the recent ODMR studies reopen this issue. It is shown that all of the ODMR results obtained to date are consistent with "the quenching model," in which the population of polarons and triplet excitons (TEs) is reduced by magnetic resonance conditions, and leads to reduced quenching of SEs by polarons and TEs. A detailed quantitative model confirms that the mechanism which causes the reduction in the polaron and TE population is the enhanced annihilation of TEs by polarons, whose populations are much larger than that of SEs under normal excitation conditions. *Operated by Iowa State University for the US Department of Energy under Contract No. W-7405-Eng-82.

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