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Magnetic field enhanced electroluminescence in organic light emitting diodes based on electron donor-acceptor exciplex blends[1] SANGITA BANIYA, TEK BASEL, DALI SUN, RYAN MCLAUGHLIN, ZEEV VALY VARDENY, Univ of Utah — A useful process for light harvesting from injected electron-hole pairs in organic light emitting diodes (OLED) is the transfer from triplet excitons (T) to singlet excitons (S) via reverse intersystem crossing (RISC). This process adds a delayed electro-luminescence (EL) emission component that is known as thermally activated delayed fluorescence (TADF). We have studied electron donor (D)/acceptor(A) blends that form an exciplex manifold in which the energy difference, ΔE_{ST} between the lowest singlet (S_1) and triplet (T_1) levels is relatively small (<100 meV), and thus allows RISC at ambient temperature. We found that the EL emission in OLED based on the exciplex blend is enhanced up to 40% by applying a relatively weak magnetic field of 50 mT at ambient. Moreover the MEL response is activated with activation energy similar that of the EL emission. This suggests that the large magneto-EL originates from an additional spin-mixing channel between singlet and triplet states of the generated exciplexes, which is due to TADF. We will report on the MEL dependencies on the temperature, bias voltage, and D-A materials for optimum OLED performance.

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