Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Degradation of fluorescent organic light emitting diodes caused by the quenching of singlet and triplet excitons

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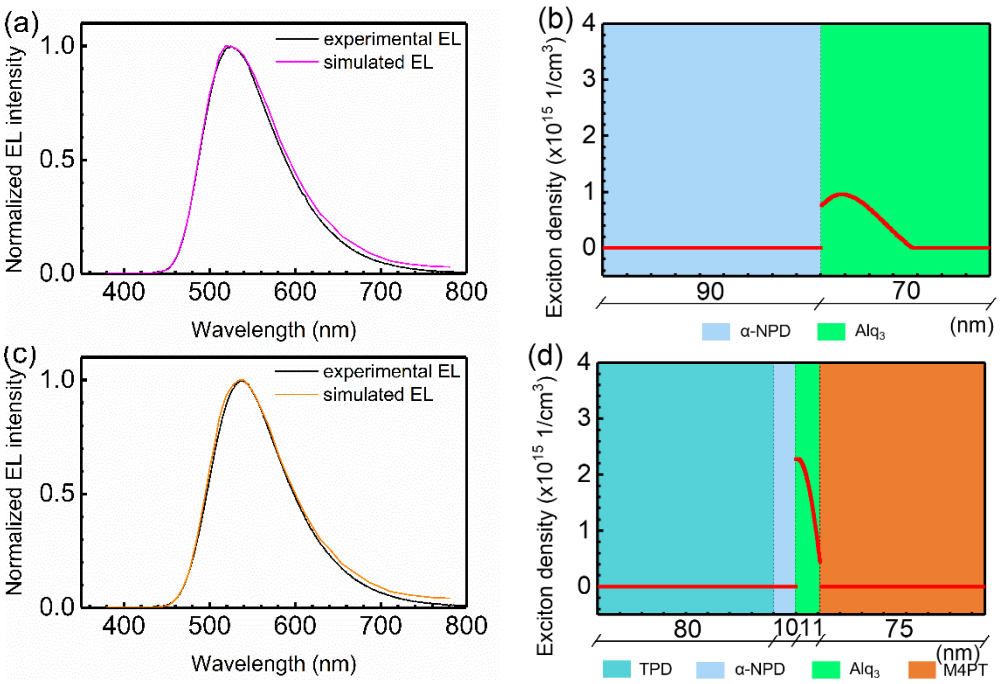

Figure S1. (a, c) Experimental and simulated EL spectra, and (b, d) exciton distribution of devices (A) and (B), respectively.

The layer structures of devices A and B were defined in the simulation program by setting the measured thickness of each layer and importing their pre-defined optical constants as a function of wavelength from the setfos database (for all materials except M4PT). The refractive index of M4PT was measured by an optical thickness meter, OPTM A-1 (Otsuka Electronics Co. Ltd.). The distribution profiles were predicted by using the 'Fitting' tool and activating the 'Emission (Spectral)' mode. The measured EL spectra of devices A and B were imported into the simulation as the reference emission spectrum and fitting target. Setfos performs a linear least-square fit to predict the emission zone profile by placing 'n' delta shaped emitters in the EML and varies their intensities, such that the simulation spectrum fits the target. More details of the fitting algorithm can be found in a literature.[1]

1) B. Perucco, N. A. Reinke, D. Rezzonico, M. Moos and B. Ruhstaller, *Optics Express*, 2010, **18**, A246-A260.

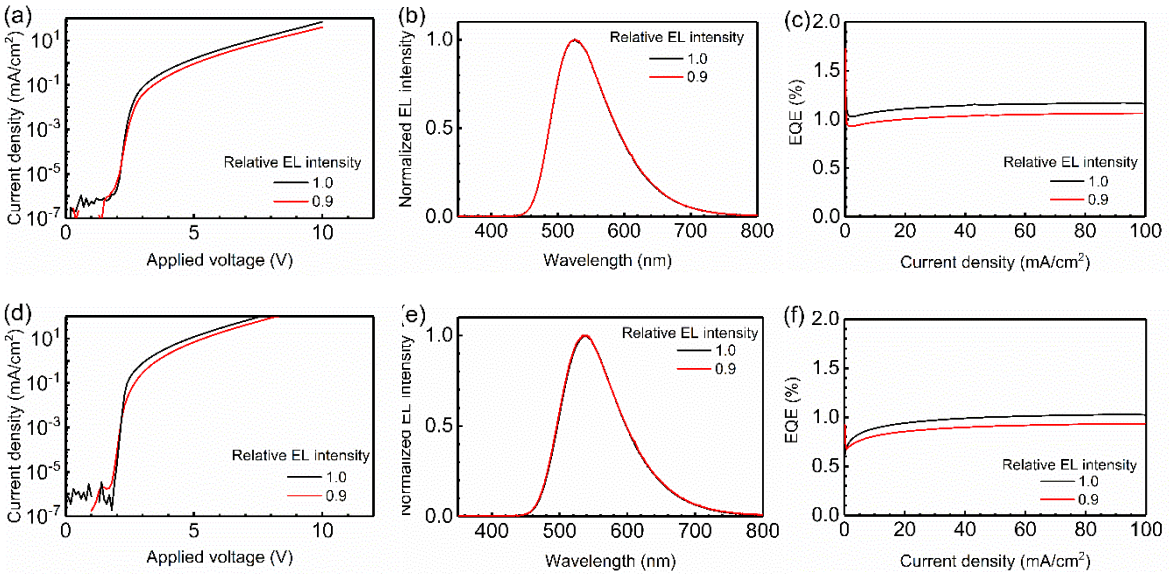

Figure S2. (a, d) Current density-voltage characteristics, (b, e) EL spectra, and (c, f) external quantum efficiency (EQE) of pristine and degraded devices (A) and (B), respectively.

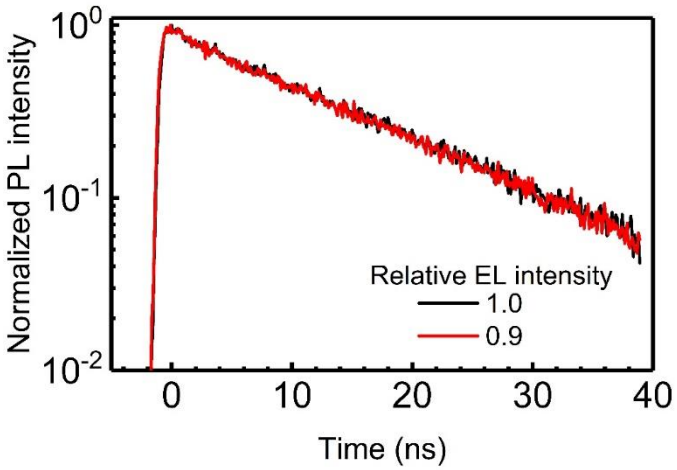

Figure S3. Time-resolved photoluminescence (TRPL) of the pristine and degraded device (A). The TRPL was measured under the excitation wavelength of 443 nm.

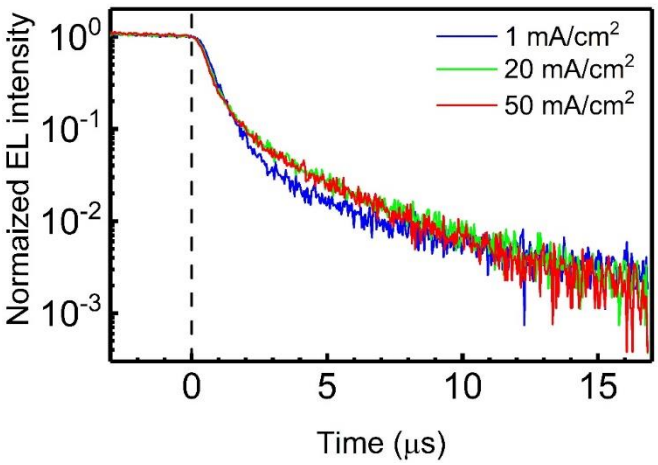

Figure S4. Time-resolved electroluminescence (TREL) for pristine device (A). The device was operated at the different current density of 1, 20 and 50 mA/cm^2.