Supplementary material:

Polariton Emission Property of the Organic Dye-Doped Polymer Microcavity

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S1 Angle-resolved experiments

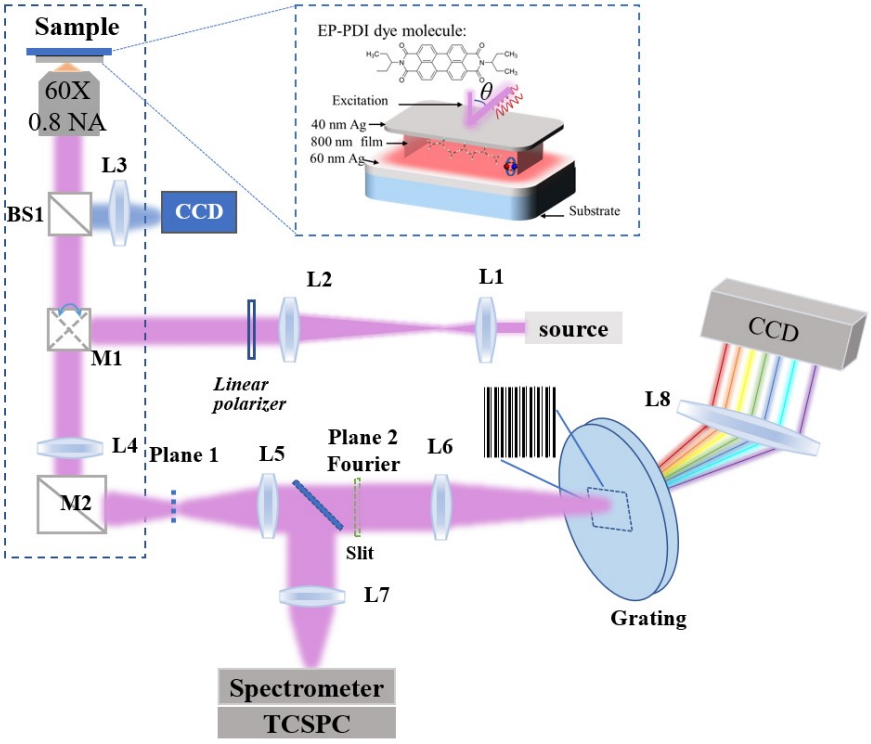

FIG. 1. Schematic diagram of self-constructed angle-resolved spectral imaging optical path experimental device on a self-constructed inverted. L1-L2 lenses: $f_1 = 30$ mm, $f_2 = 150$ mm, was to expand exciton beam; L4: tube lens; L5-L6: $f_{5,6} = 100$ mm, equivalent relay lens; L7: $f_7 = 100$ mm, focus the spectral from all angles to the spectrometer; L8: $f_7 = 100$ mm, imagination for the first order diffraction of the grating; grating: 600 lines/mm; BS: set a beam splitters, 50/50. The gray beam traces the optical path of the reflected light from the sample at all angle. The purple beam traces the optical path of the fluorescence emission from the sample at all angle. The orange beam traces the optical path of the angle-resolved spectral imaging.

S2 Angle-dependent absorption (Abs) and fluorescence (PL) spectra characterization for 3% EP-PDI dye-doped PMMA film

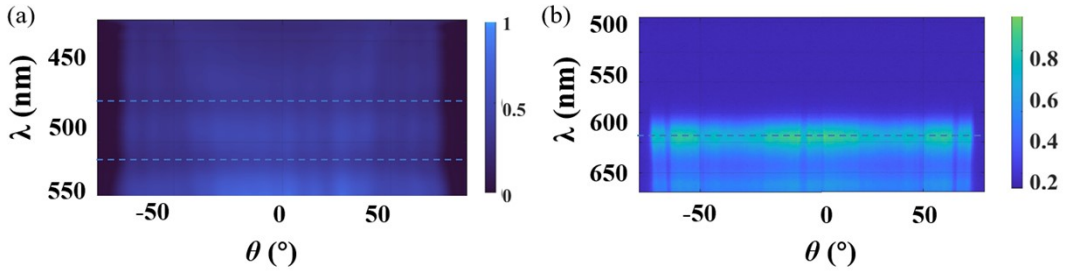

Fig.2 Angle-dependent absorption (Abs) and fluorescence (PL) spectra of 3% EP-PDI dye-doped PMMA film. The 3% EP-PDI dye-doped PMMA film layer exhibits absorption peaks corresponding to (0,0) transition at 526 nm and (0,1) transition at 493 nm, and (b) a broad excimer emission at 612 nm, indicating that the fluorescence of EP-PDI is not severely quenched at such concentration. Absorption and fluorescence of 3% EP-PDI dye-doped PMMA film have no angular resolution.

S3 Microcavity fluorescence measurements characterization from all angles

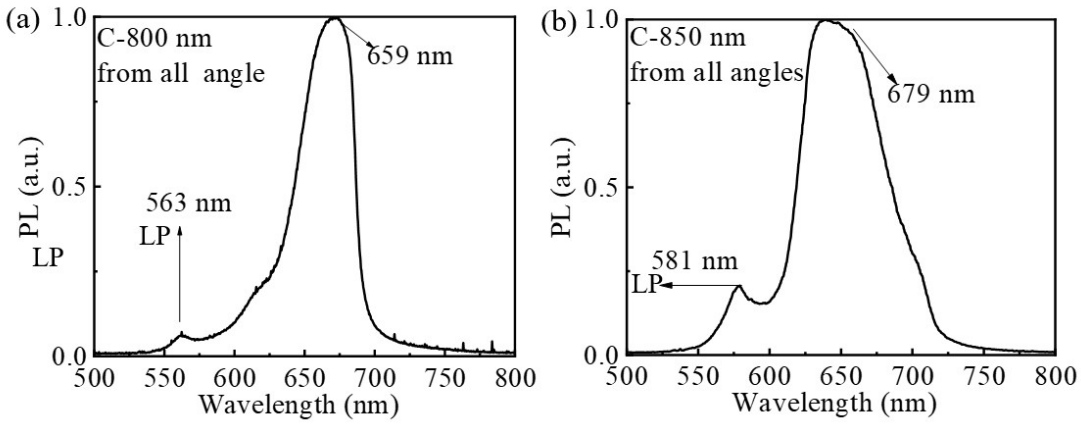

Fig. S3 (a) The fluorescence measurements (with objective lens (UPlanAPO, Olympus; ×60, NA= 0.8; θ: ±53°) from all angles in C-). (a, c) Angle-dependent reflection measurements and (b, d) Angle-dependent fluorescence of C-850 nm microcavity.

S4 Spectroscopic characterization for EP-PDI in CB solution

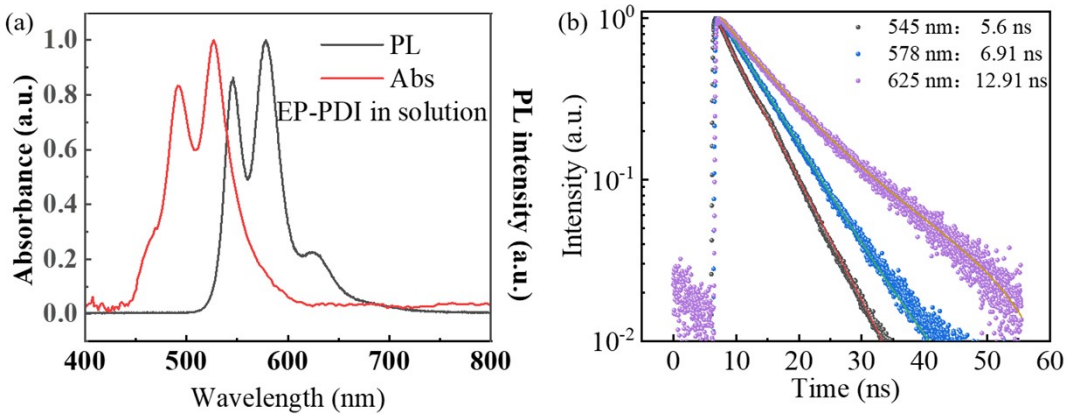

Fig. S4 Absorbance (a) and PL lifetime (b) of the EP-PDI dye in solution. PL peak of the EP-PDI dye in solution is at 545 nm, 578 nm, and 625 nm；

S5 PMMA mass and thickness characterization

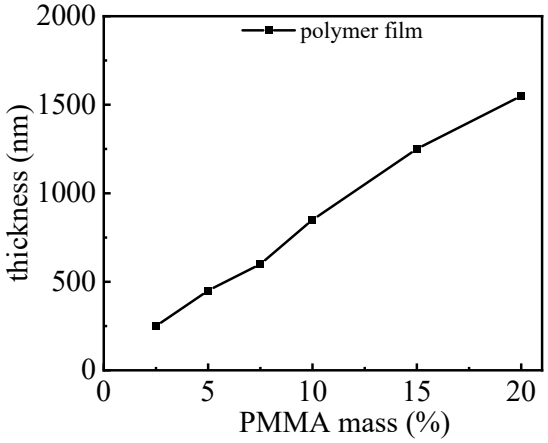

Fig. S5 Plots of the thickness of PMMA film doped by EP-PDI as a function of the mass fraction during spin coating. By changing the PMMA mass fraction, PMMA films with distinct thicknesses were obtained, which enabled us to achieve different strong coupling conditions.