Abstract Submitted
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Ultrastrong exciton-photon coupling in single and coupled organic microcavities[1] BIN LIU, ROSEMARY BRAMANTE, BRENT VALLE, KENNETH SINGER, Case Western Reserve University, TAWFIK KHATTAB, JARROD WILLIAMS, ROBERT TWIEG, Kent State University — We have demonstrated ultrastrong light-matter coupling in organic planar microcavities composed of a neat glassy organic dye film between two metallic (aluminum) mirrors in a half-cavity configuration. Such cavities are characterized by Q factors around 10. Tuning the thickness of the organic layer enables the observation of the ultrastrong coupling regime. Via reflectivity measurements, we observe a very large Rabi splitting around 1.227 eV between upper and lower polariton branches at room temperature, and we detect polariton emission from the lower polariton branch via photoluminescence measurements. The large splitting is due to the large oscillator strength of the neat dye glass, and to the match of the low-Q cavity spectral width to the broad absorption width of the dye film material. We also study the interaction between excitonic states of neat glassy organic dye and cavity modes within coupled microcavity structures. The high-reflectivity mirrors are formed from distributed Bragg reflectors (DBR), which are multilayer films fabricated using the coextrusion process, containing alternating layers of high (SAN25, n=1.57) and low (Dyneon THV 220G, n=1.37) refractive index dielectric polymers. Nonlinear optical measurements will be discussed.

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