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Waveguide Integrated Colloidal Quantum Dot Emitters MINGMING JIANG, DONGFANG LI, RASHID ZIA, Brown University — High-yield II-VI colloidal quantum dots (QDs) have received considerable attention as quantum emitters for photonic device applications. Given their scalable synthesis and self-assembly, these QDs could serve as the basis for large arrays of single photon sources. Here, we present preliminary results on the integration of CdSe-based QDs into dielectric waveguides. Specifically, we will show how the local optical environment can be used to direct and enhance QD emission into specific spatial and spectral modes. First, we will present fabrication techniques to safely embed QDs into thin film dielectric waveguides. Then, we will present experimental back-focal-plane (BFP) measurements that demonstrate how thin-film interference effects can be used to the control the QD angular emission patterns. Experimental BFP data will be discussed and analyzed in terms of theoretical predictions based on the local density of optical states (LDOS), thus demonstrating how interference effects can be used to effectively direct emission from randomly oriented QDs. If time permits, we will also show how the extension of these techniques to individual QD emitters in ridge waveguides.

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None

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