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Cavity Quantum Electrodynamics with Single Quantum Dots in Microcavities MATTHEW RAKHER, Department of Physics, University of California at Santa Barbara, STEFAN STRAUF, Department of Physics and Materials Department, UCSB, NICK STOLZ, Materials Department, UCSB, KEVIN HENNESSY, ECE Department, UCSB, ANTONIO BADOLATO, Materials Department, UCSB, EVELYN HU, Materials Department and ECE Department, UCSB, LARRY COLDREN, Materials Department, UCSB, PIERRE PETROFF, Materials Department and ECE Department, UCSB, DIRK BOUWMEESTER, Department of Physics, UCSB — Several proposals for solid-state cavity quantum electrodynamics rely on a strong interaction between the cavity mode and an embedded single atom or a single quantum dot (QD). In order to achieve a strong light-matter interaction, the cavity must have a small mode volume while maintaining a large quality factor. To this end, InAs/GaAs QDs in GaAs-based microcavities have been investigated using micro-photoluminescence spectroscopy and photon statistics measurements. Individual QDs in these devices have been identified by their photon anti-bunching signatures. Pronounced enhancement of the single QD lifetime has been measured, with some lifetimes limited by the detector resolution (200 ps), corresponding to a Purcell factor of more than 10. Together with active spatial positioning schemes of QDs, these devices are promising avenues to reach the strong coupling regime with individual solid state emitters.

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