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Controlled Coupling of Single InAs Quantum Dots to Photonic Crystal Cavity Modes ANTONIO BADOLATO, KEVIN HENNESSY, EVELYN HU, PIERRE PETROFF, Departments of Electrical & Computer Engineering, University of California, Santa Barbara, CA 93106, METE ATATURE, JAN DREISER, ATAC IMAMOGLU, Institute of Quantum Electronics, ETH Hönggerberg, CH-8093 Zurich, Switzerland, DEPARTMENTS OF ELECTRICAL & COMPUTER ENGINEERING, UNIVERSITY OF CALIFORNIA, SANTA BARBARA TEAM, INSTITUTE OF QUANTUM ELECTRONICS, ETH HÖNGGERBERG, SWITZERLAND TEAM — We describe an experimental method that allows for the deterministic coupling of a single microcavity optical mode to an integrated single InAs/GaAs quantum dot (QD). Freestanding photonic crystal slabs were used as microcavities with embedded vertically stacked QDs. The QD stack formed a tracer for the seed layer whose emission was blue-shifted by annealing when partially capped. By means of high resolution active positioning and the ability to tune the mode through the entire quantum dot spectrum, this method provided strong Purcell factor enhancement of the QD luminescence in all fabricated samples.

Antonio Badolato
Departments of Electrical & Computer Engineering, University of California, Santa Barbara, CA 93106

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