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All-Epitaxial Microcavity for Cavity-QED with Quantum Dots
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— We report on the optical characterization of a novel type of optical microcavity that forms a fully-buried semiconductor heterostructure and offers numerous technological advantages such as chemical/mechanical stability, good thermal heat-sinking, and compatibility with electrical injection. Based on epitaxial re-growth over a lithographically-defined, quantum dot-containing mesa, this approach leads to self-alignment of single dots with the field anti-node while simultaneously providing quality factors exceeding 10,000 that support lasing with only a single quantum dot layer. Time-resolved measurements reveal the most basic cavity-QED effect in this structure, namely the Purcell spontaneous emission enhancement. A strong spectral and spatial dependence of this effect is observed using photoluminescence imaging, highlighting in particular the importance of the spatial overlap.

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