Temperature Control the Ptoton-Exciton Coupling for a Quantum Dot Embedded in Pillar Microcavity

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Semiconductor microcavity that provide non-classical light states, offer unique means of controlling light-matter interactions in confined geometries and have a broad range of applications in quantum information science including single-photon sources, quantum computation and quantum communication. In recent years, cavity quantum electrodynamics (QED) effects have been studied in varieties of solid-state systems. Here, we present a direct approach for the fabrication of self-assembled Ⅲ-Ⅴ quantum dots embedded in a pillar microcavity utilizing focused ion beam (FIB) etching. By tuning the temperature to control the coupling of the quantum dots with a discrete cavity mode, we observe a considerable Purcell enhancement effect and the temperature dependent behavior of single quantum dot is also studied.