

Abstract Submitted
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Spontaneous emission enhancement of colloidal CdSe nanoplatelets. ZHILI YANG, University of Maryland, College Park, MATTHEW PELTON, University of Maryland, Baltimore, EDO WAKS, University of Maryland, College Park — Colloidal CdS /CdSe/CdS nanoplatelets synthesized recently are high efficient nano-emitters and gain media for nanoscale lasers and other nonlinear optical devices. They are characterized as quantum well structure due to energy gap difference between core CdSe and shell CdS, of which the luminescent wavelength could be tuned precisely by their thickness of growth. However, the influence of environment on the material's optical properties and further enhancement of the emission to implement nanoscale systems remains to be investigated. Here we demonstrate spontaneous emission rate enhancement of these CdSe nanoplatelets coupled to a photonic crystal cavity. We show clearly the photoluminescent spectrum modification of the nanoplatelets emission and an averaged Purcell enhancement factor of 3.1 is achieved when they are coupled to carefully-designed nanobeam photonic crystal cavities compared to the ones on unpatterned surface in our experiment of lifetime measurement. Also the phenomenon of cavity quality factor increasing is observed when increasing intensity of pumping, which attributes to saturable absorption of the nanoplatelets. Our success in enhancement of emission from these nanoplatelets here paves the road to realize actual nanoscale integrated systems such as ultra-low threshold micro-cavity lasers.

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