

Abstract Submitted
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Record Extinction of a Laser Beam by a Single Quantum Dot

NICK VAMIVAKAS, METE ATATURE, University of Cambridge, JAN DREISER, TUNC YILMAZ, ANTONIO BADOLATO, Swiss Federal Institute - Zurich, ANNA SWAN, BENNETT GOLDBERG, Boston University, ATAC IMAMOGLU, Swiss Federal Institute - Zurich, SELIM UNLU, Boston University — The ability to efficiently couple far-field light to subwavelength light emitters is of critical importance for the rapidly growing field of nanophotonics. In this talk we present our recent work on the use of both index matched GaAs solid immersion lenses (SIL) and numerical aperture increasing lenses (NAIL) to improve far-field light coupling to and from single InAs/GaAs quantum dots. The SIL/NAIL leads to significant improvements in both non-resonant and resonant spectroscopic studies of single QDs. By incorporating a SIL/NAIL in resonant scattering measurements we find that a single InAs QD can extinguish nearly 12% of the exciting laser beam; a seven-fold improvement in extinction when compared to measurements made without a SIL/NAIL. The strong extinction makes it possible to measure a typical QD extinction using a dc power-meter without the need for phase sensitive lock-in detection.

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