Abstract Submitted
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**Ultra-low threshold photonic crystal quantum dot laser** STEFAN STRAUF, KEVIN HENNESSY, MATTHEW T. RAKHER, ANTONIO BADOLATO, PIERRE M. PETROFF, EVELYN L. HU, DIRK BOUWMEESTER, PHYSICS, MATERIALS AND ECE DEPARTMENT, UNIVERSITY OF CALIFORNIA SANTA BARBARA, CA 93106, USA TEAM — Photonic crystal microcavities can provide small mode volumes on the order of one wavelength cubed. As a consequence, spontaneous emission coupling of the gain medium into spurious modes is highly suppressed and the threshold pump power for lasing activity can be very low [1]. We have fabricated 2D photonic crystal microcavities with embedded self-assembled InAs/GaAs quantum dots as active material. Single mode emission with quality factors up to 10000 has been found for various L3-type cavity geometries covering the wavelength region of 910-970 nm. Single mode lasing under optical excitation is characterized by line width narrowing and record low threshold pump powers down to 160 nW, corresponding to a high degree of spontaneous emission coupling efficiency. Together with active positioning schemes of the mode maximum with respect to the quantum dot location [2], this type of microcavity is highly attractive for reaching the regime of single quantum dot lasing. [1] G. Bjoerk, A. Karlsson, and Y. Yamamoto, Phys. Rev. A, **50**, 1675 (1994). [2] K. Hennessy et al., Photonics and Nanostructures – Fundamentals and Applications 2 (2) 65-72 (2004).

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