

Strongly Coupled Single-Quantum-Dot Nanocavity System: From Vacuum Rabi Splitting to Lasing

H. M. Gibbs, G. Khitrova, B. C. Richards, J. Hendrickson, J. Sweet, J. D. Olitzky

College of Optical Sciences, The University of Arizona, Tucson, AZ 85721, USA

hyattgibbs@att.net

U. Khankhoje and A. Scherer

Electrical Engineering, California Institute of Technology, Pasadena, CA 91125, USA

D. M. Schaadt, D. Z. Hu, M. Helfrich, D. Litvinov, D. Gerthsen, M. Wegener

Karlsruhe Institute of Technology (KIT), Wolfgang-Gaede-Strasse 1, D-76131 Karlsruhe, Germany

Progress on single-quantum-dot nanocavities will be presented. The emphasis will be upon GaAs/AlGaAs photonic-crystal-slab nanocavity devices, including MBE growth of structures with smooth interfaces and fabrication of nanocavities with quality factor Q values as high as 25,000 using electron beam lithography and chemically assisted ion beam etching. Semiconductor cavity QED experiments by us and others will be described, including vacuum Rabi splitting, sources of single photons on demand, and coherent emission using a few or even a single quantum dot.