Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Photoluminescence imaging of Focused-Ion-Beam induced individual quantum dots JIEUN LEE, TIMOTHY SAUCER, Department of Physics, University of Michigan, ANDREW MARTIN, Department of Materials Science and Engineering, University of Michigan, DEBORAH TIEN, Department of Physics, University of Michigan, JOANNA MILLUNCHICK, Department of Materials Science and Engineering, University of Michigan, VANESSA SIH, Department of Physics, University of Michigan — Quantum dots are nanostructures that confine electrons in 3 spatial dimensions. Due to their discrete atom-like energy levels, a wide variety of applications related to the optical properties of dots are possible. One such application is to integrate quantum dots in optical nanocavities for the enhanced interaction between electrons and photons. However, self-assembled dots typically nucleate at random locations, hindering the accurate coupling between the dot and cavity. Therefore, spatial control on self-assembled dots at the fabrication level is highly desirable. Here, we report on optical measurements conducted on InAs quantum dots that are prepatterned in a square array by a focused-ion-beam. Using scanning confocal microscopy, we spatially map the photoluminescence of individual quantum dots. Single dot luminescence with 160 μeV linewidth is observed indicating good optical quality and statistical analysis over 16 array sites show reasonable placement accuracy and emission inhomogeneity.

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Date submitted: 08 Nov 2010 Electronic form version 1.4