Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Sub micron scale patterning of material optical response through focused ion beam induced InAs/GaAs quantum dot nucleation TIMOTHY SAUCER, JIEUN LEE, ANDREW MARTIN, DEBORAH TIEN, JOANNA MIRECKI-MILLUNCHICK, VANESSA SIH, The University of Michigan — We report on the technique of using a focused ion beam to produce preferential sites for InAs/GaAs quantum dot nucleation. We mill an array of holes in the GaAs substrate and then deposit a thin layer of InAs below the critical thickness for dot formation in unpatterned areas. The array of holes on the substrate act as preferential nucleation sites and induce quantum dot formation only in the patterned regions. We conduct photoluminescence spectroscopy in a templated multilayer quantum dot sample at temperatures down to 10K and for various patterning conditions. We find that outside of our patterning regions we have no quantum dot luminescence, indicating that the patterning modifies the optical response of the material. We find that we can control this quantum dot formation down to array spacings of 250nm, showing excellent potential for this technique to be used for sub micron spatial control of a material's optical properties.

Timothy Saucer
The University of Michigan

Date submitted: 05 Nov 2010 Electronic form version 1.4