Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Quantum Dots Confined in Nanoporous Alumina Membranes
JUN XU, JIANFENG XIA, JUN WANG, JOSEPH SHINAR, ZHIQUN LIN, Iowa State University — Precise control over the dispersion and lateral distribution of quantum dots (QDs) within nanoscopic porous media provides a unique route to manipulate the optical and/or electronic properties of QDs in a very simple and controllable manner for applications related to light emitting, optoelectronic, and sensor devices. Here we filled nanoporous alumina membranes (PAMs) with CdSe/ZnS core/shell QDs by dip coating. The deposition of QDs induced changes in the refractive index of PAMs. The amount of absorbed QDs was quantified by fitting the reflection and transmission spectra observed experimentally with one side open and freestanding (i.e., with two sides open) PAMs employed, respectively. The fluorescence of the QDs was found to be retained within the cylindrical nanopores of PAMs.

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Date submitted: 17 Nov 2006 Electronic form version 1.4