Abstract Submitted
for the OSF13 Meeting of
The American Physical Society

Optical investigation of GaAs/AlGaAs heterostructure nanowires[1] TENG SHI, HOWARD JACKSON, LEIGH SMITH, University of Cincinnati, JAN YARRISON-RICE, Miami University, BRYAN WONG, Sandia National Laboratories, NIAN JIANG, QIANG GAO, HOE TAN, CHENNUPATI JAGADISH, Australian National University, JOANNE ETHERIDGE, Monash University — A set of GaAs/AlGaAs heterosturcture nanowires which contain quantum well tubes (QWTs) with AlGaAs layers on both sides wrapped around a 50nm GaAs core are grown by Au-seeded MOCVD. Individual nanowires are studied by low temperature photoluminescence (PL) experiments, which give evidence of increasing quantum confinement with decreased QW growth time. Using structural and alloy concentration information obtained from high resolution transmission electron microscope measurements, we are able to carry out an eigenfunction expansion calculation using a cylindrical QW. By employing this theoretical modeling, we can calculate the QW widths from the ground state emission of these QWTs. A linear relationship between the QW growth time and QW width is found. Localized quantum dots in very narrow GaAs QWTs are also observed. In addition, spatially-resolved PL measurements show that these localized states are randomly distributed along the long axis of the nanowire.

[1]We acknowledge the support of the NSF through DMR-1105362, 1105121 and ECCS-1100489, the DOE DE-AC04-94-AL85000 and the ARC.

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Date submitted: 13 Sep 2013 Electronic form version 1.4