

Nominal PbSe Nano-Islands on PbTe: Grown by MBE, Analyzed by AFM and TEM

Peter Moeck, Jeahuck Lee and James E. Morris
Portland State University
Portland, OR

Mukes Kapilashrami
The Royal Institute of Technology
Stockholm, Sweden

Nigel D. Browning
University of California at Davis
Davis, CA
National Center for Electron Microscopy
Lawrence Berkeley National Laboratory
Berkeley, CA

Patrick J. McCann
University of Oklahoma
Norman, OK

Heteroepitaxial semiconductor quantum dots are expected to lead to “paradigm changes in semiconductor physics.” The PbSe/PbTe quantum dot system is particularly interesting for mid-infrared vertical cavity surface emitting lasers. Preliminary transmission electron microscopy (TEM) results showed that there is atomic ordering in the structure of free-standing three-dimensional (3D) nominal PbSe nano-islands on nominal PbSe wetting layers that were grown in the Stranski-Krastanow mode by means of molecular beam epitaxy (MBE) on PbTe/BaF₂ pseudo-substrates.

In this paper we report results of an atomic force microscopy (AFM) study of such a sample. TEM results from both the nano-island and the wetting layer of this same sample will also be discussed.