Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Quantum Dot Nanostructures: HREM Charactrization and Perspectives in Applications for Soalr Energy Conversion SERGEI ROUVIMOV, Portland State University, MIKHAIL MAXIMOV, VICTOR USTINOV, Ioffe Physico-Technical Institute, S.A. BLOKHIN, Ioffe Physico-Technical Institute, A.R. KOVSH, Innolume GmbH — The paper reviews the progress in growth and characterization of quantum dot (QD) nanostructures, and the perspectives of their application in multi-layer semiconductor solar energy converters. While unique electronic properties of QDs have been already successfully utilized in novel high-speed quantum dot lasers [1], QDs seem to be promising for novel solar cells due to tunable bandgap and energy level structure [2]. High resolution electron microscopy (HREM) played an important role in understanding of self organization phenomena and QD properties as well as in optimization, control and engineering of QD nanostructures (tuning QD size and density, using stacked multilayered QD structures and controlling vertical and lateral coupling) to superior laser performance (temperature-independent, low threshold currents, high differential gain). The paper addresses current developments and challenges in application of QD nanostructures to solar energy conversion as well as progress and perspectives in HREM analysis of quantum dot structures. [1] V.M. Ustinov, et al *Electronics Letters*, 34, 670-672 (1998) [2] A. Nozik, in *Nanostructured and Photochemical systems for solar photon conversion*, World Scientific Publ., 2008, p.147

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Date submitted: 07 Jan 2010 Electronic form version 1.4