Abstract Submitted
for the TSF06 Meeting of
The American Physical Society

Simulation of RHEED Images for a quantitative assessment of pyramidal-shaped quantum dots.[1] CHANDANI RAJAPAKSHA, ANDREA FELTRIN, ALEXANDRE FREUNDLICH, Center for Advanced Materials and Physics Department, University of Houston — The understanding of structural and electronic properties of semiconductor nanostructures has become a challenging issue in recent years. Thus far deciphering structural properties of quantum dots(QDs), especially Stranski-Krastanov QDs (SKQDs) has been mainly limited to post-fabrication *ex-situ* microcopy observations and X-ray diffraction characterizations. Real-time monitoring of structural properties during the manufacture of these dots provides with a far more attractive tool as it enables a real time study and tuning of these properties. However considering the complex nature of three dimensional SKQDs, real time monitoring by Reflection high-energy electron diffraction (RHEED), a technique available on most UHV molecular beam epitaxy (MBE) systems has been limited to *qualitative* characterizations. In this study, we have shown through a careful modeling of RHEED patterns the potential for a real time and *in situ quantitative* assessment of SKQD structural parameters during the MBE. The RHEED images are calculated for simulated uncapped InAs SKQDs on GaAs substrate using Kinematical diffraction theory. The calculation is supported by a full atomistic evaluation of strain SKQDs and take into account both diffraction and refraction of electron. A clear correlation is established between the evolution of RHEED patterns and SKQD facet orientations and dot heights.

[1]This work was partially supported by the NASA grant No. NNCO4GB53N

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Date submitted: 14 Sep 2006 Electronic form version 1.4