

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Dielectric Confinement and Optical Properties of ZnO Quantum

Rods IGOR L. KUSKOVSKY, Queens College of CUNY, New York, NY, M. YIN, Y. GU, Y. GONG, T. ANDELMAN, S. OBRIEN, Columbia University, New York, NY, A. SHABAEV, NRL, Washington, DC — ZnO has been of great interest for UV RT applications due to its wide band gap and high exciton binding energy. The device performance is often improved by the use of low-dimensional structures. There have been many reports on the fabrication and the optical properties of ZnO nanorods; however, no quantum confinement was reported until recently [1, 2]. At the same time, it has been shown [3] that the dielectric confinement must be considered for the correct analysis of absorption and emission from 1D quantum systems. The role of dielectric confinement in the optical properties of ZnO quantum rods is studied here. Specifically, we compared optical absorption of ZnO quantum rods dissolved in hexane and chloroform. We have found that the absorption energy is higher when hexane is used as a solvent. This is explained, qualitatively, by the increase in the single particle energies due to the dielectric confinement [3], since the ZnO dielectric constant is larger than that of hexane, but almost equal to that of chloroform. Finally, we shall discuss the role of confinement on the green emission observed in these quantum rods. 1. M. Yin, *et al.*, J. Am. Chem. Soc. **126**, 6206 (2004). 2. Y. Gu, *et al.*, Appl. Phys. Lett. **85**, 3383 (2004). 3. A. Shabaev and Al. L. Efros, Nano Lett., **4**, 1821 (2004).

Igor L. Kuskovsky

Date submitted: 01 Dec 2004

Electronic form version 1.4