Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Photoluminescence Efficiency of Self Assembled Ge Dots DAVID J. LOCKWOOD, NELSON L. ROWELL, National Research Council Canada, ISABELLE BERBEZIER, GUILLAUME AMIARD, ANTOINE RONDA, Institut Matériaux Microélectronique Nanosciences de Provence, DAVID GROSSO, Université Pierre et Marie Curie — For self assembled Ge dots, the predicted nonlinear increase in the photoluminescence (PL) efficiency with decreasing dot diameter has been evaluated using the dot size distribution observed from atomic force microscopy and transmission electron microscopy. The dots were formed by thermal annealing of an amorphous Ge layer deposited by molecular beam epitaxy on a thin insulating layer of either TiO_2/SiO_2 or just SiO_2 [1] on Si(001). For the present range of particle sizes (2.5 to 60 nm), the dot PL appeared primarily as a wide near-infrared band near 800 meV. The peak energy of the PL band reflects the average dot size and its shape depends on the dot size distribution. Using theoretical calculations for the band gap energy, the PL energy spectrum was transformed into the PL variation with dot size. The present results show how, conversely, dot size distributions can be obtained from PL data.

[1] N.L. Rowell, et al., J. Electrochem. Soc. 156, H913 (2009).

David J. Lockwood
National Research Council Canada

Date submitted: 05 Nov 2009 Electronic form version 1.4