Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Stress-Induced Shifts of the Photoluminescence and Raman Peaks in $Al_xGa_{1-x}As$ Observed as a Function of Al Composition GRADY WHITE, Ceramics Division, National Institute of Standards and Technology, ALBERT PAUL, Ceramics Division, National Insitute of Standards and Technology, KRIS BERTNESS, Optoelectronics Division, National Institute of Standards and Technology — In $Al_xGa_{1-x}As$, both photoluminescence (PL) and Raman peak positions are strongly sensitive to x, a fact that has made PL a primary tool for monitoring composition in the optoelectronics industry. However, the peak positions also depend upon stress. Because layered thin film systems inherently experience residual stresses, use of PL or Raman measurements without compensation for existing stresses limits the accuracy of composition determination. We present results of both PL and Raman measurements of $Al_xGa_{1-x}As$ films as a function of biaxial tensile stress for $0 \leq x \leq 0.9$, comparing the sensitivity of the stress-induced shifts with the composition-induced shifts and, thereby, providing an estimate of the uncertainties associated with composition determination. We also discuss an upper limit to the composition sensitivity of the phonon deformation potentials of $Al_xGa_{1-x}As$.

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Date submitted: 14 Dec 2006 Electronic form version 1.4