Ellipsometric studies of GaAs$_{1-x}$Bi$_x$ (0.00 $\leq x \leq 0.13$) alloys

S.G. Choi, National Renewable Energy Laboratory, D.E. Aspenes, North Carolina State University, A.J. Ptak, R. France, A.G. Norman, D.H. Levi, National Renewable Energy Laboratory — A series of GaAs$_{1-x}$Bi$_x$ (0.00 $\leq x \leq 0.13$) alloy thin films has been grown by molecular beam epitaxy on GaAs(001). Structural properties were characterized by high-resolution x-ray diffraction and cross-sectional transmission electron microscopy. Above-bandgap optical properties were determined by spectroscopic ellipsometry at room temperature. In order to minimize artifacts from surface overlayers in the measured spectra, in-situ wet chemical etching procedures were employed. Major optical structures observed are associated with the $E_1$, $E_1 + \Delta_1$, $E'$, and $E_2$ interband-transition critical-points (CPs). An additional broad optical structure was also found at around 2 eV for high Bi-concentration samples ($x \geq 0.04$). The CP parameters and their composition-dependences were obtained from the spectral analysis done in reciprocal-space. This abstract is subject to government rights.

S.G. Choi
National Renewable Energy Laboratory

Date submitted: 19 Nov 2009

Electronic form version 1.4