Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Anisotropic direct-to-indirect band gap transition in shock- and ramp-wave compressed GaAs[1] M.D. MCCLUSKEY, P. GRIVICKAS, Y.M. GUPTA, Washington State University — Gallium arsenide (GaAs) is an important material for laser diodes, light emitting devices, and high-speed electronics. Strain-induced electronic band structure changes affect the performance of multi-layered GaAs-based devices. In the present work, effects of uniaxial strain on the low-temperature photoluminescence of GaAs were investigated using shock and ramp wave compression along the [100], [111], and [100] orientations. Uniaxial strain transformed GaAs from a direct-gap to an indirect-gap semiconductor, dramatically altering its optical properties. Unlike hydrostatic pressure, uniaxial strain along [111] produces a large splitting of the L band. This causes the L-band minimum to plunge downward, resulting in a novel "L-gap" semiconductor.

[1]Work supported by DOE/NNSA.

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Date submitted: 14 Feb 2011 Electronic form version 1.4