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Determination of the deformation potentials of GaN using shock wave compression[1] M.D. MCCLUSKEY, H.Y. PENG, Y.M. GUPTA, Institute for Shock Physics — Gallium nitride (GaN) is a wide-band-gap semiconductor used widely in blue lasers and light-emitting diodes. Since the layers in these devices are under considerable strain, an accurate determination of the optical deformation potentials is important for modeling and design. Toward that end, in the present work, the band-gap shift of GaN has been studied as a function of uniaxial compression along the *c*-axis using time-resolved, optical absorption measurements in shock wave experiments. Single-pass, optical transmission measurements were obtained in thin GaN samples grown heteroepitaxially on sapphire substrates. Previous estimates of the band-gap deformation potentials, which were based on samples under hydrostatic pressure or biaxial stress, varied over a wide range. Shock compression provided a novel approach for determining the deformation potentials accurately. Based on the experimental results, a set of deformation potentials was obtained. The values indicate that the deformation potentials in wurtzite GaN are anisotropic, contrary to common assumptions.

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