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THz radiation from coherent acoustic phonon waves in strained GaN-based heterostructures YOUNG-DAHL JHO[1], Univ. of Florida, JIN-YOUNG SOHN, Seoul Nat'l Univ., GARY D. SANDERS, CHRISTOPHER J. STANTON, Univ. of Florida, EUNSOON OH, Chungnam Nat'l Univ., DAI-SIK KIM, Seoul Nat'l Univ. — We present experimental results and discuss the generation mechanism of newly found THz radiation in GaN/InGaN based light emitting diode (LED) structures. These structures show strong coherent acoustic phonon oscillations under ultra-short optical excitation and we discuss the role these coherent phonons play in the generation of the THz signal. To better understand the role of piezoelectricity on the generation of the acoustic phonons and THz radiation, an external field was applied to compensate the built-in piezoelectric field. The coherent oscillatory behavior of the differential reflectivity spectra was reduced and finally become independent of the increasing applied voltage. However, with reverse bias, the THz emission from these structures was found to increase with increasing reverse voltage and excitation energy, slightly distinct from the trend of the photocurrent. The frequency of the THz emission is related to the transit time of the acoustic phonons between the AlGaN layers. The bias and wavelength dependence of the THz generation suggests that wavefunctions of confined carriers at the AlGaN/GaN and AlGaN/InGaN interfaces, are modulated by a temporally-changing potential shape associated with the piezoelectric field of the lattice and are responsible for the THz radiation.

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