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Time-resolved x-ray diffraction studies of the thermal properties of AlGaAs Y.M. SHEU, FOCUS Center and Department of Physics, University of Michigan, Ann Arbor, Michigan 48109-1040, USA, S.H. LEE, Length/Time Metrology Group, Korea Institute of Standards and Science,Daejeon 305-600, Republic of Korea, D.M. FRITZ, J.K. WAHLSTRAND, FOCUS Center and Department of Physics, University of Michigan, Ann Arbor, Michigan 48109-1040, USA, M. REASON, R.S. GOLDMAN, Department of Material Science & Engineering, University of Michigan, Ann Arbor, Michigan 48109-2136, USA, D.A. REIS, FOCUS Center and Department of Physics, University of Michigan, Ann Arbor, Michigan 48109-1040, USA — We report on studies of thermal properties of epitaxial AlGaAs on GaAs using an ultrafast laser-excitation and x-ray probing technique. Femtosecond laser pulses were used to excite the material at the buried interface. Heat is generated by electron-hole recombination in the GaAs substrate and diffuses into the AlGaAs film. Following the initial heating the film and substrate cool as heat diffuses into the bulk. Time resolved X-ray diffraction (TRXD) is sensitive to precise lattice movement and can resolve the time evolution of the material as it reaches thermal equilibrium. We show that TRXD has the potential to study thermal properties such as the thermal conductivity and thermal boundary resistance in hermoelectric materials.

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