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Strain-induced second harmonic generation arising from a traveling coherent acoustic phonon pulse measured as a function of depth JOY GARNETT, HALINA KRZYZANOWSKA, JUSTIN GREGORY, STEPHANIE GILBERT CORDER, JENNIFER JONES, ZEYNAB JARRAHI, NORMAN TOLK, Vanderbilt University — Transient second harmonic generation signals and detection of generated coherent longitudinal acoustic phonons are measured simultaneously in reflection from GaSb/GaAs thin layer structures at room temperature using an ultrafast laser pump-probe technique. This proof of concept approach is intended to reveal various surface science phenomena as a function of depth, and is based on the observation that the acoustic strain pulse induces localized changes of electric, acoustic, and optical properties as it propagates through the material. This localized traveling pseudo-interface allows a platform for the depth-dependent study of numerous surface science phenomena. The surface phenomenon of interest in this study is second harmonic generation (SHG). Here, we compare the experimentally observed strain-induced SHG with a theoretical model of the strain influence on SHG which phenomenologically describes the relation between strain and the second order nonlinear optical susceptibility that contributes to SHG.

[1] Y. D. Glinka, N.H. Tolk, J.K. Furdyna, Phys. Rev. B. 84, 153304 (2011).

Joy Garnett
Vanderbilt University

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