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Time-resolved second harmonic generation study of buried semiconductor heterointerfaces using soliton-induced transparency Y.D. GLINKA[1], Department of Physics, University of Texas at Austin, Austin, Texas 78712, USA, N.H. TOLK, Department of Physics and Astronomy, Vanderbilt University, Nashville, Tennessee 37235, USA, J.K. FURDYNA, Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556, USA — The transient second harmonic generation (SHG) and linear optical reflectivity (LOR) signals measured simultaneously in reflection from GaAs/GaSb/InAs and GaAs/GaSb heterostructures revealed a new mechanism for creating self-induced transparency in narrow bandgap semiconductors at low temperatures, which is based on the dual-frequency electro-optic soliton propagation. The mechanism takes account of the photo-Dember field solitary wave, which traps both the fundamental and SHG pulses, slowing their velocity down to that of the solitary wave. The trapped light pulses maintain the amplitude of the solitary wave and hence create a condition, at which the self-reinforcing nonlinear optical polarization (dual-frequency electro-optic soliton) can propagate through the semiconductor. This allows the ultrafast carrier dynamics at buried semiconductor heterointerfaces to be studied.

[1]Institute of Physics, National Academy of Sciences of Ukraine, Kiev, 03028, Ukraine

Y. D. Glinka
Department of Physics, University of Texas at Austin

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