

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Near-field optical second-harmonic technique for detection and characterization of semiconductor thin film electron-scattering domain boundaries** FARBOD SHAFIEI, The University of Texas at Austin, TOMMASO ORZALI, GENNADI BERSUKER, Sematech, DOWNER MICHAEL, The University of Texas at Austin — Understanding electron transport in epitaxial semiconductor thin films and low dimension systems is crucial for new electro-optic devices. III-V films grown on Si integrate high carrier mobility into the established Si platform, but are susceptible to formation of sub-micron anti-phase domains that possess unwanted Ga-Ga or As-As electron-scattering defects at their boundaries. Optical second-harmonic generation provides sensitive, specific and noninvasive but so far only spatially-integrated characterization for these defects [1]. We introduce a fiber based nearfield scanning optical second harmonic microscopy for the first time to fully resolve the electron scattering boundaries on III-V/Si films. This technique reveal variations in electron scattering boundaries structure as growth conditions, epitaxial film composition, and substrate vary, and are compared with surface topography, darkfield transmission electron microscopy and electron back scatter diffraction. Suppression of the electron-scattering boundaries has been explored.

[1] Lei *et al.*, Appl. Phys. Lett. 102, 152103 (2013).

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Date submitted: 13 Nov 2014

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