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Stress Imaging in Indented Si Wafers by Confocal Raman Microscopy JEROEN SCHOENMAKER, Surface and Microanalysis Science Division - NIST - Gaithersburg, MD., ROBERT F. COOK, Ceramics Division - NIST - Gaithersburg, MD., LUKAS NOVOTNY, The Institute of Optics, U. of Rochester, Rochester, NY., STEPHAN J. STRANICK, Surface and Microanalysis Science Division - NIST - Gaithersburg, MD. — Controlling stress and strain, and consequently, carrier mobility in semiconductor devices is one of the main goals of recent electronic industry. On the other hand, fracture propagation is commonly related to performance degradation in microelectronic and microelectromechanical (MEMS) devices. As miniaturization reaches submicron scales, characterization tools with improved resolution and capable to detect buried surfaces is required. In this work we present confocal Raman imaging in Si wafers to analyze stress and fracture by means of hyperspectral measurements (typically 128x128 spectra). We analyzed indented Si wafers presenting wide range of plastic deformation and fractures. Wide scans (up to 150x150 μm^2) as well as high-resolution scans depict the stress distribution around indented regions and side fractures. Some of the samples were covered with 8 nm of Ti deposited in LN_2 temperature. In these samples we acquired hyperspectral images in subsurface conditions and detected possible influences of thermal budged in the stress distribution. We also demonstrate depth sensitivity in a vertical scan. Images suggest 0.3 μm resolution.

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