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Using Scanning Microwave Impedance Microscopy (sMIM) to characterize defects in dopants and dielectrics in semiconductor devices STUART FRIEDMAN, YONGLIANG YANG, FRED STANKE, OSKAR AMSTER, PrimeNano, Inc — As semiconductor technologies adopt advanced designs and materials, it becomes critical to be able to characterize, at the nanoscale, dopant distributions, dielectric properties and interface and thin-film quality. Scanning Microwave Impedance Microscopy (sMIM) is an atomic force microscope (AFM) based electrical measurement technique that measures local permittivity and conductivity at nanoscale dimensions. It can also measure the capacitance of the tip-sample junction or nanostructures. Non-linear properties of samples and nano-structures can be probed by applying a bias to the sMIM tip and recording capacitance-voltage curves. This talk will present results of characterizing and imaging a number of materials and structures from advanced semiconductor technologies. Examples will include (1) quantifying the doping level and imaging the doping distributions of both Si and III-V devices, and (2) quantifying dielectric properties including the use of capacitance-voltage curves to characterize defects in buried gate oxides.

Stuart Friedman
PrimeNano, Inc

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