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Advances in imaging and quantification of electrical properties at the nanoscale using Scanning Microwave Impedance Microscopy (sMIM)[1]

STUART FRIEDMAN, FRED STANKE, YONGLIANG YANG, OSKAR AMSTER, PrimeNano, Inc — Scanning Microwave Impedance Microscopy (sMIM) is a mode for Atomic Force Microscopy (AFM) enabling imaging of unique contrast mechanisms and measurement of local permittivity and conductivity at the 10s of nm length scale. sMIM has been applied to a variety of systems including nanotubes, nanowires, 2D materials, photovoltaics and semiconductor devices. Early results were largely semi-quantitative. This talk will focus on techniques for extracting quantitative physical parameters such as permittivity, conductivity, doping concentrations and thin film properties from sMIM data. Particular attention will be paid to non-linear materials where sMIM has been used to acquire nano-scale capacitance-voltage curves. These curves can be used to identify the dopant type (n vs p) and doping level in doped semiconductors, both bulk samples and devices.

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