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

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— 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 10's of nm length scale. Recent results will be presented illustrating high-resolution electrical features such as sub 15 nm Moire' patterns in Graphene, carbon nanotubes of various electrical states and ferro-electrics. In addition to imaging, the technique is suited to a variety of metrology applications where specific physical properties are determined quantitatively. We will present research activities on quantitative measurements using multiple techniques to determine dielectric constant (permittivity) and conductivity (e.g. dopant concentration) for a range of materials. Examples include bulk dielectrics, low-k dielectric thin films, capacitance standards and doped semiconductors.

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