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Imaging the full optical response of graphene surface plasmon polaritons SAMUEL BERWEGER, JUSTIN GERBER, BRIAN O'CALLAHAN, MARKUS RASCHKE, University of Colorado, Department of Physics, Department of Chemisty, and JILA — The full realization of electronic devices based on graphene requires the complete characterization of defects and their effect on local electronic properties. Using infrared scattering-type scanning near-field optical microscopy (IR *s*-SNOM) surface plasmon polariton propagation in graphene can be imaged with nanometer spatial resolution, providing information on the local electronic properties. Here we use *s*-SNOM imaging to provide full infrared optical characterization of graphene SPPs by studying both the amplitude and phase of the near-field scattered light. We develop a simple phenomenological model based on SPP reflection from boundaries and defects that provides semi-quantitative agreement for both amplitude and phase simultaneously. These results provide insight into nanometer scale variations in the electronic structure of graphene and thus inform future device development.

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