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Microwave microscopy of graphene and graphite VLADIMIR TALANOV, Neoceral LLC Beltsville, MD 20705, CHRISTOPHER DEL BARGA, LEE WICKEY, IRAKLI KALICHAVA, Materials Engineering Department, New Mexico Tech, Socorro NM 87801, EDWARD GONZALES, ERIC SHANER, AARON GIN, Center for Integrated Nanotechnologies and Sandia National Laboratories, Albuquerque, NM 87185, NIKOLAI KALUGIN, Materials Engineering Department, New Mexico Tech, Socorro NM 87801 — Graphene has emerged as a promising material for high speed nano-electronics applications due to the relatively high carrier mobility that can be achieved. To further investigate electronic transport in graphene and reveal its potential for microwave applications [1,2], a near-field scanning microwave microscope with the probe formed by an electrically open end of a 4 GHz half-lambda parallel-strip transmission line resonator has been employed [3]. We find that the microwave response of mono- and few-layer graphene flakes is determined by the local sheet impedance, which is found to be predominantly active. From fitting a quantitative electrodynamic model (relating the probe resonant frequency shift to 2D conductivity of single- and few-layer graphene) to the experimental data we evaluate graphene sheet resistance as a function of thickness. Near-field scanning microwave microscopy can simultaneously image location, geometry, thickness, and distribution of electrical properties of graphene without a need for device fabrication.

Vladimir Talanov
Neoceral LLC Beltsville, MD 20705

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