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Dielectric and Conductivity Mapping of Few-Layer Metal Chalcogenides KEJI LAI, DI WU, YINGNAN LIU, YUAN REN, University of Texas at Austin, MIN LIN, HAILIN PENG, Peking University, ARIEL ISMACH, RUDRESH GHOSH , RODNEY RUOFF, University of Texas at Austin — A novel microwave impedance microscope was used to spatially map the local dielectric constant and conductivity of few-layered metal chalcogenides without the need of contact electrodes. For phase-change In_2Se_3 nanoplates grown on mica substrates, our results showed a sudden drop of permittivity from the bulk value for thicknesses below 5 layers and strong dielectric inhomogeneity around 4 and 5 layers. For CVD-grown MoS_2 flakes on SiO_2/Si wafers, we observed highly conductive localized regions within monolayer islands. These regions, which can be imaged by scanning electron microscopy and atomic force microscopy, show enhanced Raman signals and PL signal quenching. Continued imaging effort is expected to shed some light on the growth mechanism and electron physics of these quasi-2D chalcogenides.

Keji Lai
University of Texas at Austin

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