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Dependence of the Low Energy Electronic Structure of Multilayer Graphene on Stacking Order Probed by Infrared Absorption MATTHEW SFEIR, KIN FAI MAK, JAMES MISEWICH, TONY HEINZ, COLUMBIA UNIVERSITY, NEW YORK, NY 10027 COLLABORATION, BROOKHAVEN NATIONAL LABORATORY, UPTON, NY 11973 COLLABORATION — Optical conductivity spectra of multi-layer graphene samples were determined for photon energies in the range of 0.2 – 1.0 eV. The measurements were performed using synchrotron radiatiaon on well-characterized exfoliated graphene samples on a transparent substrate. We observed distinct optical conductivity spectra for different samples having precisely the same number of layers. In particular, two well-defined types of spectra were obtained in measurements of more than a dozen of four-layer samples. This result can be understood by considering the existence of two stable configurations of four-layer graphene, namely, the ABAB Bernel stacking and the ABCA rhombohedral stacking. The observed absorption features were reproduced by explicit calculations, within a tight-binding model, of the optical conductivities for the two stacking sequences. We have thus shown the possibility of identifying these different crystallographic structures optically. Further, the significant difference found in the low-energy electronic structure suggests that the charge transport behavior of multilayer graphene may also depend on stacking order.

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