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A non-contact measurement of local charge density in organic semiconductor monolayer XIAOHUI QIU, National Center for Nanoscience and Technology, China, YEPING JIANG, National Center for Nanoscience and Technology, China; Tsinghua University, QIONG QI, RUI WANG, National Center for Nanoscience and Technology, China, QIKUN XUE, Tsinghua University, CHEN WANG, National Center for Nanoscience and Technology, China, CHAO JIANG, NATIONAL CENTER FOR NANOSCIENCE AND TECHNOLOGY, CHINA COLLABORATION, TSINGHUA UNIVERSITY COLLABORATION —
The dynamic response of charge carriers in a monolayer film of pentacene grown on SiO2 surface has been investigated using an electric force microscope (EFM). The method characterized the electrostatic interactions between an EFM tip and the pentacene islands of various sizes that were formed by in-situ partitioning a coalesced pentacene polycrystalline film into separate domains. The observed dependence of EFM frequency-shift on the size of pentacene islands strongly suggests the existence of mobile charges in the single layer of pentacene on SiO2 substrate. The characteristic of the capacitance-voltage profile in pentacene monolayer film was observed, and the carrier concentration of the pentacene film was derived. The approach avoids the electrostatic complexity in conventional measurements using fixed metal electrodes, providing a general method for directly investigating the behavior of local carrier in organic thin films on dielectric substrates.

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