

Abstract Submitted  
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**Charge localization and inhibition of self-assembly in tetraphenyl porphyrin on Cu(111)** GEOFFREY ROJAS, XUMIN CHEN, DONNA KUNKEL, JIE XIAO<sup>1</sup>, PETER A. DOWBEN, AXEL ENDERS, University of Nebraska-Lincoln, ENDERS RESEARCH TEAM, DOWBEN RESEARCH TEAM — A study of the nature of the electronic structure and inter-molecular interaction of the adsorbed tetraphenyl porphyrin (H<sub>2</sub>TPP)/Cu(111) system using scanning tunneling spectroscopy (STS) and inverse photoemission spectroscopy (IPES) is presented. By studying STS and IPES spectra as a function of increasing coverage, significant upshifts in the local shockley surface state near the adsorbate as a well interfacial HOMO-LUMO gap state are observed in monolayer-thick films. This, combined with observations of changes in the local workfunction and distortions of the Cu(111) surface within 1 Å of the molecules, indicates strong molecule-interface electronic interaction and stronger bonding. Such strong electron transfers and resulting charge dipoles are the origin of observed inter-molecular Coulomb repulsion, thereby preventing self-assembly of first-monolayer H<sub>2</sub>TPP/Cu(111) systems, while allowing for self-assembly of second-monolayer and higher, where no such surface states are observed.

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