Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Quasi-1D States Confined in a Self-Assembled Organic Super-Lattice of TTF-TCNQ on Ag(111)[1] SEOKMIN JEON, Oak Ridge National Laboratory (ORNL), PANCHAPAKESAN GANESH, BOBBY SUMPTER, ORNL, JORGE IRIBAS CERDÁ, Instituto de Ciencia de Materiales de Madrid, PETRO MAKSYMOVYCH, ORNL, CNMS TEAM, ICMM-CSIC TEAM — Organic charge transfer complexes (CTC) have drawn much attention due to their potential applications to conducting or semiconducting organic thin films and contacts in devices. TTF-TCNQ is a historic organic CTC with one of the highest conductivity values among numerous organic conductors. As a two-component molecular material, TTF-TCNQ in a low-dimension form on a surface naturally creates monolayer super-lattices with corrugated electrostatic potential and adsorbate-induced strain. Generally this will lead to strong confinement of the surface states, although the detailed response of the surface electronic structure remains to be understood. We investigated TTF-TCNQ monolayer films grown on Ag(111), Au(111) and Ag(100) surfaces using STM/STS at 4.3 K. Confinement of sp-derived surface states was indeed ubiquitous, including spontaneous formation of quantum dots and quasi-1D bands. The small periodicity of the lattice caused a complete depopulation of the surface states, with up to 1 eV upshift of the band minimum - much stronger effect than normally observed in assemblies. This also allows us to infer the height of the confining potential using 1D Kronig-Penney model and critically assess the long-standing problem of molecule-surface charge transfer.

[1]A portion of this research was conducted at the Center for Nanophase Materials Sciences, which is a DOE Office of Science User Facility

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Date submitted: 14 Nov 2014 Electronic form version 1.4