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Sub-molecular electronic structure of self-assembled metal-organic nano-chains on a noble metal surface AGUSTIN SCHIFFRIN, MARTINA CAPSONI, ADAM SHAW, SARAH BURKE, University of British Columbia — Complexes composed of organic ligands coordinated with transition metal atoms exhibit broad absorption bands from the ultraviolet to the near-infrared. These are the result of the intrinsic molecular electronic properties, which include intra-ligand excitations and metal-to-ligand charge transfer. When adsorbed on a surface, these compounds are relevant for photovoltaic applications. In order to ensure a hierarchical transfer of function from the nano- to the macro-scale, electronic characterization at the single molecule level is essential. We present a low-temperature scanning tunneling spectroscopy study on the local electronic structure of one-dimensional self-assembled metal-organic nanostructures formed on a noble metal surface. The nano-chains consist of terpyridine-based ligands coordinated with iron (Fe) adatoms. We map the local density of electronic states of the system with sub-molecular spatial resolution. Energy-broadened highest-occupied molecular orbitals are dominated by metal states, whereas sharp resonances above Fermi are mainly related to the organic moiety. Coordination between the ligand and Fe induces energy shifts and a break of spatial symmetry of the unoccupied states, pointing to an electron transfer from the metal atom to the terpyridine groups.

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