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Growth and electronic structure of tetracyanoethylene on noble metals studied by scanning tunneling microscopy DANIEL WEGNER, RYAN YAMACHIKA, YAYU WANG, Department of Physics, University of California at Berkeley, BART BARTLETT, JEFF LONG, Department of Chemistry, University of California at Berkeley, MIKE CROMMIE, Department of Physics, University of California at Berkeley — Tetracyanoethylene (TCNE, $C_2(CN)_4$) is a π-electron acceptor with a very strong electron affinity that easily forms charge-transfer complexes with other organic molecules and metals. We have performed STM and STS of isolated TCNE molecules and ordered sub-monolayer coverages on noble-metal surfaces in order to study the competition between intermolecule and molecule-substrate interactions, and the impact this might have on film-growth and electronic structure. HOMO and LUMO peaks were observed for single TCNE molecules on Ag and Au substrates using STS, but not for Cu substrates which react more strongly with TCNE. The spatial distribution of the TCNE HOMO, as observed in dI/dV maps, fits well with DFT calculations and shows that TCNE is in a negatively charged state on these metal substrates. dI/dV maps of ordered TCNE arrays indicate that neighboring TCNE molecules interact strongly with each other in some cases.

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