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Electronic structural properties of phenol adsorption of Fe_2O_3 nanoclusters and (0001) surface NADRA SAKR, Department of Physics, Louisiana State University, MATTHEW PATTERSON, Department of Chemistry, Louisiana State University, ORHAN KIZILKAYA, Center for Advanced Microstructures and Devices, Louisiana State University, RICHARD KURTZ, PHILLP SPRUNGER, Department of Physics, Louisiana State University — Temperature dependent electronic structure of phenol adsorbed on single-crystal Fe_2O_3(0001) and Fe_2O_3 nanoparticles is investigated. in an effort to further understand how environmentally persistent free radicals (EPFRs) are formed. EPFR formation on metal oxide powders is typically accompanied by a reduction of metal cations as electrons are transferred from the aromatic precursor. The current study takes a surface science approach to study the atomic-scale formation of EPFRs on single-crystal Fe_2O_3(0001) and 18 nm Fe_2O_3 nanoparticles in order to guide a more fundamental understanding of the mechanism of radical formation. Here we use synchrotron-based photoemission (UPS), XPS, FTIR, and EELS to probe the surface electronic and vibrational structure of phenol adsorbed on an environmentally abundant metal oxide in order to develop an atomic-scale understanding of the electronic structure of the composite organic/metal oxide system and better elucidate the physical interactions that produce known trends in the lifetime, reactivity, and biological activity of EPFRs.

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