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Interfacial Matrix Stabilization Spectroscopy (IMSS) studies of CO and O2 interactions with thin films of oxide-supported Au nanoparticles NINA K. JARRAH, DAVID T. MOORE, Lehigh University — Interfacial Matrix Stabilization Spectroscopy (IMSS) employs energy-dissipating cryogenic matrix isolation techniques combined with FTIR to enable stabilization and detection of pre-reactive complexes of CO and O2 formed on oxide-supported gold nanoparticles (AuNPs). Following deposition of CO and O2 in an argon matrix at 10-20K, annealing to warmer temperatures (28-32K) promotes diffusion of isolated dopant molecules through the matrix to binding sites on a thin film of catalyst. Matrix-solvated pre-reactive complexes form at the surface and are characterized spectroscopically. Comparison of observed complexes in IMSS experiments with results from direct adsorption studies, in absence of a matrix, can provide a measure for the stabilizing effects of matrix solvation. Subsequent surface warming following stabilization of the pre-reactive complexes reveals qualitative information about relative binding energies of formed intermediates of CO, O2, and the supported AuNPs. A series of FTIR spectra mapping the evolution of vibrational bands during the annealing process and tracking the various surface-bound species will be presented and comparisons to direct adsorption experiments will be discussed.

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