325a Structure-Function Relationships in Pd-Au Catalysts

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Model mixed-metal catalysts consisting of Pd alloyed with Au as bulk films on refractory metal single crystals and as nanoparticles supported on oxides have been characterized using an array of surface techniques including X-ray photoemission spectroscopy (XPS), low energy ion scattering spectroscopy (LEIS), Auger electron spectroscopy (AES), low energy electron diffraction (LEED), infrared reflection absorption spectroscopy (IRAS), metastable impact electron spectroscopy (MIES), scanning tunneling microscopy (STM), temperature programmed desorption (TPD), and reaction kinetics. The surface sensitivity of LEIS and IRAS has been exploited for elucidating atomic composition of the outermost surface layer. Of special interest is the composition of the surface compared to the overall composition, particularly in transitioning from planar surfaces to nanoparticles, in the presence and absence of adsorbates. The mechanistic details of the vinyl acetate synthesis reaction, used to probe the structure-function relationship of these alloy surfaces, will also be discussed.