The second example uses the tools of surface science, coupled with optical pulse shaping methods, to address the quantum control of surface chemical dynamics. Carefully designed self-assembled monolayer samples along with surface sum frequency generation as a feedback signal, have been used to optimize selective bond manipulation at the surface. Possible applications to heterogeneous catalysis and electronic device preparation will be presented.

4:30 PM The Genesis and Integration of Heterogeneous, Homogeneous, and Enzyme Catalysis on the Nanoscale
Professor Gabor A. Somorjai

The synthesis of metal and bimetallic nanoparticles in the 1-10 nm range, and mesoporous high surface area oxides, were utilized as heterogeneous catalysts. The rates and chemical selectivity of multipath reactions were dependent on the nanoparticle size and the oxide-metal nanoparticle interface composition. Instruments including laser spectroscopy (sum frequency generation vibrational spectroscopy) and synchrotron based x-ray spectroscopies and scanning tunneling microscopy reveal the mobility and dynamic restructuring of adsorbed and reacting molecules and catalyst surfaces under reaction conditions. The formation of covalent bonds between the adsorbed molecules and the diverse structures of the catalyst surfaces are one important ingredient of catalytic selectivity. The charge transfer of oxide-metal interfaces to the reacting molecules (acid-base catalysis) is the other important property of catalytic reactivity. Metal nanoparticles at 1 nm size (40 atoms) and below behave as single metal-ion transition metal homogeneous catalysts. Studies of adsorbing enzyme catalysts on oxide surfaces explore how their rates and chemical selectivities are altered in progress.

5:45 PM Social Hour
6:45 PM William H. Nichols Medal Award Dinner
Professor Kenneth B. Eisenthal (Columbia University) will introduce the Medalist


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