BERKELEY CATALYSIS CENTER

Distinguished Lecture Series Seminar

August 30, 2006 The McCollum Room
775A & B Tan Hall
10:00 - 12:00 Noon

Dr. Johannes Lercher

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"Functional Characterization of Solid Acids and Bases"

ABSTRACT:

Solid acids and bases have a complex surface chemistry and – with the exception of few well-crystallized zeolites a large variety of acidic and basic sites differing in strength and concentration. This complexity has driven the quest for the complete physicochemical description of the surfaces of solid acids and bases. Hence, the majority of the studies describe the oxide surface as complex assembly of the acidic and basic site, which is governed by defect chemistry. Moreover, as the size of the converted molecules approaches the size of the pores pronounced transport restrictions may also alter the reaction paths. In order to understand and predict properties, the catalytic functionality of a particular material (e.g., structure, strength, accessibility) has to be understood qualitatively and quantitatively.

Three experimental approaches can be identified: (i) The description of properties of unknown materials and the generic interactions of molecules with particular solids; (ii) The understanding of reaction steps and the chemistry on a known material and (iii) The control of operating conditions for a catalyzed reaction on a known material. All three approaches rely strongly on spectroscopy under reaction conditions, able to follow the sorption and reactions of reactant and products molecules, if possible together with the variations in the structural and electronic properties of the material

The lecture will address stepwise the concepts and the experimental realization and will outline the potential and limitations with respect to practical catalyst and process development.