New Insights into Heterogeneous Oxidation Catalysis

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2010 marks the tenth anniversary of the Irsee Scientific Symposia sponsored by The Robert Karl Grasselli Foundation (a non profit organization). The recent symposium was the fifth in the series, and represented another successful gathering of internationally acknowledged leaders in the area of selective oxidation catalysis. The oral presentations, discussions, and uninhibited exchange of ideas was lively and mutually profitable, as has become the custom at these informal gatherings.

The scientific content and the proceedings of the Irsee V symposium are recorded in this publication and cover a broad spectrum of subjects that stand at the frontier of oxidation catalysis, structural and material science, and reaction mechanisms.

The areas discussed span from the idea that single atoms might suffice to catalyze certain relatively simple reactions to the complexity of ammoxidation reactions that require at least a bi-metallic, bi-functional active center located on well crystalline metal oxide surfaces, with key catalytic elements strategically placed within bonding distances of the reacting molecules.

Several new ideas are presented on the requirements and makeup of the active centers for propane oxidation, as well as refinements of the structure of the *M1* phase of the

MoVNbTeO catalyst system, and the role of the vanadium distribution in *M1*. An in depth analysis of the 32 compositional possibilities at the active center of *M1* reveals the complexity of this system from which the diverse reaction pathways in propane and propylene ammoxidation can be predicted. Detailed mechanistic insights of propylene oxidation and ammoxidation on the *M2* phase are also highly illuminating.

New in depth understanding of methanol adsorption on V_2O_5 (0001) is lucidly presented, as are mechanistic ideas of methanol oxidation to formaldehyde on cation vacant spinel type catalysts.

The breadth of the symposium's subject matter is further reflected by contributions relating materials science to catalysis, studies of electrochemically promoted selective oxidations, use of nanoparticles in the direct synthesis of H_2O_2 , partial oxidation of H_2S to sulfur, the aerobic selective oxidation of cyclohexane by nano-structured catalysts, and the upgrading of producer gas.

Because of the success of the symposium and the high scientific quality of its proceedings presented in this publication, we plan to hold another one of these symposia in 2013 at Kloster Irsee, Germany.

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