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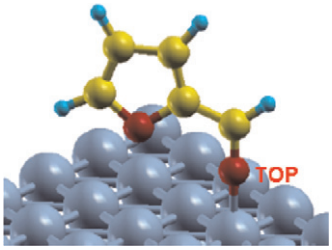
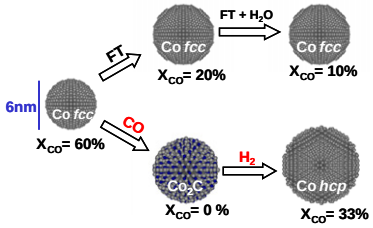
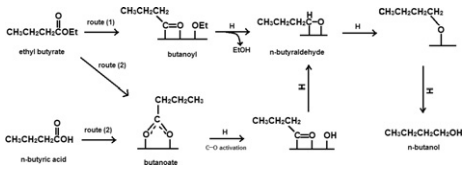


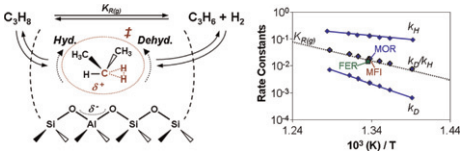
Furfural on a copper surface. The most likely species adsorbed on the Cu surface is a top η^1(O)-aldehyde species. Hydrogenation of this species occurs via H attack on the carbonyl C or carbonyl O, resulting in an alkoxide or a hydroxyalkyl intermediate, respectively. DFT calculations indicate that the first attack on the carbonyl O is energetically more favorable.



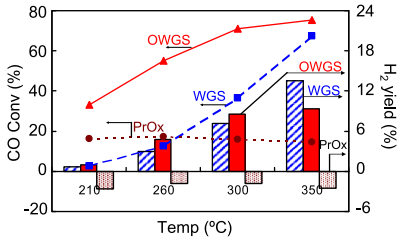
Direct characterization using *in situ* synchrotron-based XRD combined with simultaneous analysis of the reaction products by on-line gas-chromatography was indicative of considerable versatility of alumina-supported cobalt catalysts promoted with platinum under realistic conditions of Fischer–Tropsch synthesis.



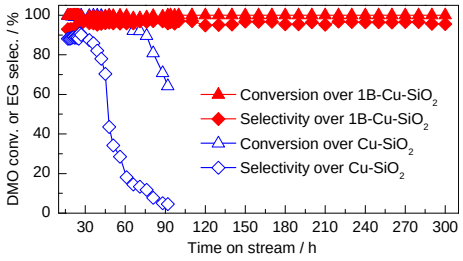
The hydrogenation of ethyl butyrate and *n*-butyric acid to corresponding alcohols follows an inverse kinetic isotope effect on γ-Al_2O_3-supported cobalt catalyst. Butanoate and butanoyl are the stable surface intermediate species formed over the surface of catalyst, and hydrogenation of these intermediates is likely involved in the rate-limiting step.



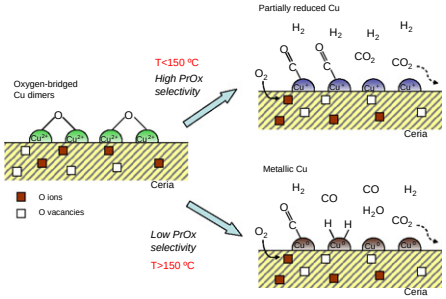
Alkene Hydrogenation on Acidic Zeolites: Brønsted acid sites in FER, MFI, and MOR zeolites catalyze monomolecular alkane dehydrogenation and its microscopic reverse, alkene hydrogenation with H_2, via the same kinetically-relevant $(C–H–H)^+$ carbonium-ion-like transition states, even far from equilibrium. The measured rate constants, activation energies and activation entropies for dehydrogenation and hydrogenation are related by the equilibrium constant and the enthalpy and entropy for the stoichiometric gas-phase reaction, which are independent of the reactivity and structure of the active sites.



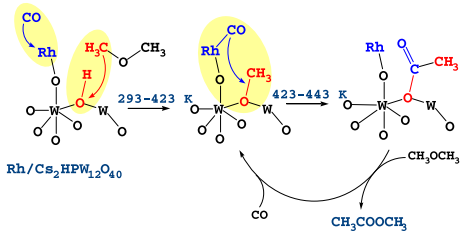
Oxygen-enhanced water gas shift (OWGS) can lead to much higher CO conversion and higher H_2 yield than the conventional water gas shift (WGS) over the same bimetallic Pt–Cu/CeO_2 catalyst under comparable reaction conditions.



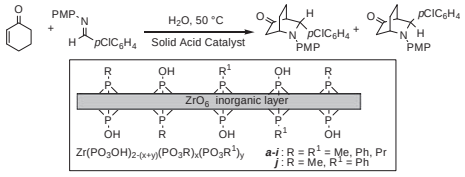
Doping a proper quantity of boric oxide onto a Cu–SiO_2 catalyst significantly improves its stability as well as its activity for the vapor-phase hydrogenation of dimethyl oxalate to ethylene glycol.



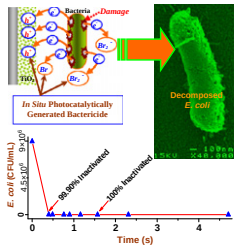
The origin of preferential oxidation (PROX) of CO in the presence of H_2 was traced to the carbonyl stabilization on partially-reduced copper oxide surface, at below 150 °C, preventing thus incoming H_2 from approaching the oxidation sites.



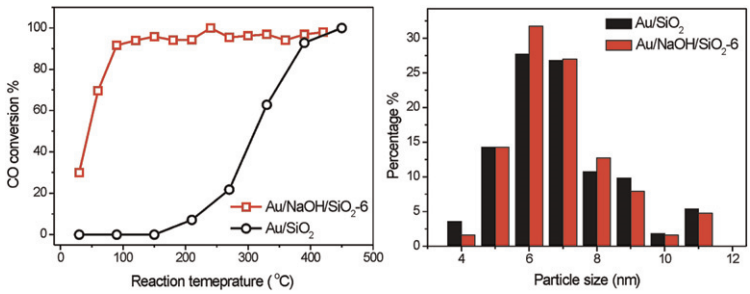
The mechanism of the halide-free carbonylation of dimethyl ether with carbon monoxide on $Rh/Cs_2HPW_{12}O_{40}$ has been established. The formation and inter-conversions of the reaction intermediates – surface methoxy-groups, Rh-carbonyls and surface acetates, has been monitored with ^{13}C solid-state NMR. The bi-functional character of the catalyst has been directly demonstrated.



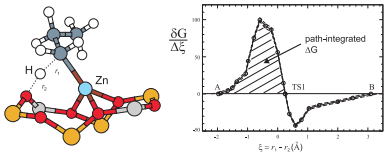
New zirconium hydrogen phosphate alkyl and/or aryl phosphonates with high surface area (200–380 m^2/g) have been prepared, and their Brønsted acid catalytic activity was tested on the direct aza-Diels–Alder reaction of 2-cyclohexen-1-one with N-PMP-*p*Cl-benzaldimine in aqueous medium.



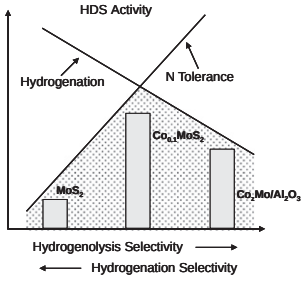
The proposed bactericidal method utilizes *in situ* photoelectrocatalytically generated bactericides to achieve instant inactivation and rapid decomposition of Gram-negative bacteria. The method is capable of inactivating 99.90% of *Escherichia coli* within 0.4 s and mineralizing over 40% biomass within 600 s.



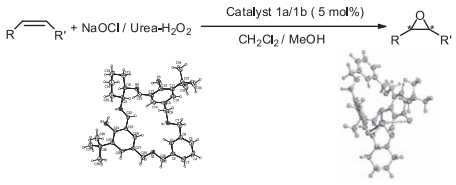
Hydroxyls can induce the activation of molecular oxygen on "inert" Au nanoparticles for low-temperature CO oxidation.



Configuration of propane adsorbed on the Zn^{2+} cation used for the dissociation of the hydrogen atom (left). Gradients of the free energy calculated for the dissociation along the reaction path (right).



An ultra-deep diesel hydrodesulfurization catalyst such as the unsupported $Co_{0.1}MoS_2$ requires a balance between the hydrogenation function and resilience to organonitrogen inhibition. The Al_2O_3-supported Co_2Mo catalyst ($z > 0.3$) is a commercial hydrodesulfurization catalyst.



Chiral macrocyclic Mn(III) Schiff base complexes catalyze the enantioselective epoxidation of non-functionalized alkenes with sodium hypochlorite or urea hydrogen peroxide in presence of several pyridine *N*-oxide at 0–5 °C.