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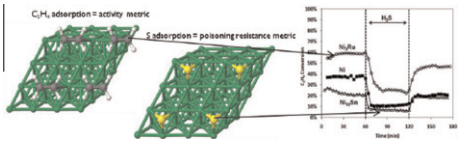
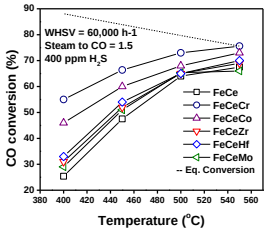
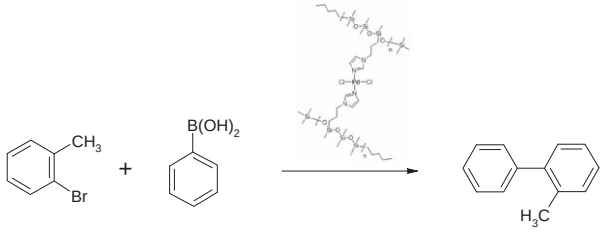


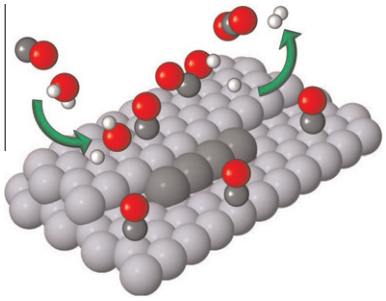
Density functional theory calculations were used to screen ethylene and sulfur adsorption energies of model Ni bimetallic surfaces. These calculations were used to successfully identify Ni-based sulfur-resistant ethylene reforming catalysts. NiRu catalysts were found to exhibit improved activity, both in the presence and in the absence of sulfur, compared with pure Ni both for ethylene reforming and for the reforming of tars in biomass-derived synthesis gas.



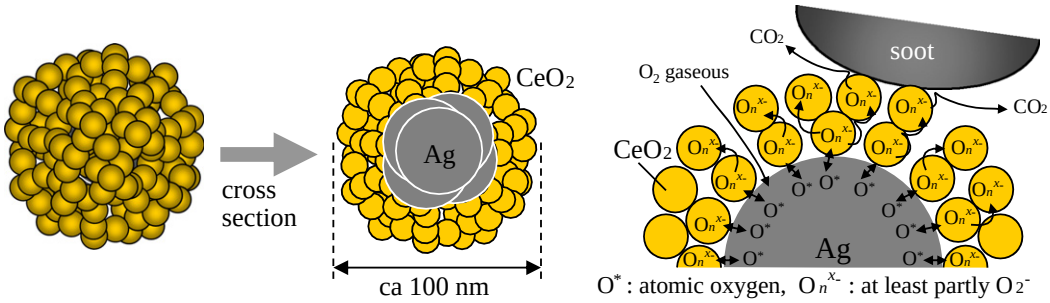
High temperature water gas shift reaction (WGS) at low steam to CO ratios has been investigated over $Fe_{2.4}Ce_{0.3}M_{0.3}O_4$ (M = Cr, Co, Zr, Hf, and Mo) type of spinels. Remarkably, both Cr- and Co-doped Fe/Ce catalysts show excellent activity at steam to CO ratio as low as 1.5. Other dopants namely Zr, Hf, and Mo have little or no effect on the WGS activity of Fe/Ce.



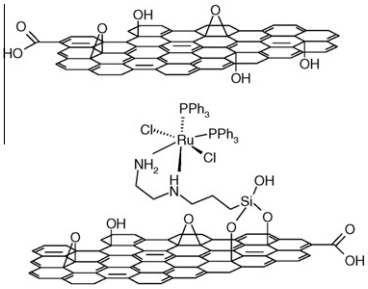
Palladium supported on siloxane polymer functionalized with imidazole groups efficiently catalyzes Suzuki–Miyaura reaction under mild conditions in environmentally friendly solvents such as water or a 2-propanol/water mixture. The catalyst is transformed to Pd(0) nanoparticles bonded to the polymer and showed very good recyclability.



Kinetic and isotopic measurements suggest that the water-gas shift reaction proceeds by an associative mechanism on Pt(1 1 1). The kinetically relevant step consists of unimolecular decomposition of adsorbed carboxylate intermediates. The surface loses activity over time due to the formation of carbonaceous deposits which nucleate at step-edges and subsequently oligomerize.



A CeO_2–Ag catalyst with 'rice-ball' morphology exhibits exceptional performance for soot oxidation. The moderately large Ag particles (>30 nm) and large interface with small CeO_2 particles result in the formation of active oxygen species on the Ag surface and migration to soot particles.



Excellent selectivities in the hydrogenation of cinnamaldehyde have been obtained with $Ru(PPh_3)_3Cl_2$ immobilised onto three different carbon materials: graphite, carbon nanofibers, and graphite oxide (GO).