

Abstract of Presentation

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Presentation Title:

From Gold to Green: Catalysis by Clusters

Abstract :

Gold was regarded as poorly active as a catalyst. However, when Au is supported as nanoparticles (2-10 nm in diameter) on base metal oxides, it exhibits surprisingly high catalytic activity for many reactions in gas and liquid phases. Quite recently we have found that Au clusters below 2nm (less than 300 atoms) behaves differently from nanoparticles and exhibit some unique catalytic properties which may lead to green and sustainable chemistry. The first example is gas phase epoxidation of propylene with molecular oxygen, which is an ideal reaction that produces only what we want. The three critical conditions are Au clusters smaller than 2 nm, alkaline-treated TS-1(titanosilicalite) as a support, and addition of water to the reactant. The second example is hydrogenation of benzene to cyclohexene catalyzed by coprecipitated $\text{AuLa}_2(\text{OH})_4$ calcined at 150°C in H_2/N_2 . It is composed of Au clusters as small as 1.5 nm. The third example is one pot syntheses of secondary amines from primary ones with Au clusters deposited on Al-MOF(metal organic framework) by solid grinding with dimethy Au(III) acetylacetonate.