

Title: Bimetallic Nanoparticles for Catalytic Hydrogenations

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Catalysts are the cornerstone of the petrochemical industry. Bimetallic catalysts are widely used for upgrading the octane ratings of gasolines through petroleum reforming processes. Heterogeneous and homogeneous catalysts are extensively used for the production of commodity chemicals. Our work has been focused on the synthesis of new nanoscale bi- and multimetallic heterogeneous catalysts by using mixed metal cluster complexes as catalyst precursors. This work involves the blending of tin with traditional noble metal such as platinum, ruthenium and rhodium. We have recently shown that phenylstannanes are excellent reagents for introducing tin ligands into polynuclear transition metal carbonyl complexes. By controlling the composition of the complexes, we have been able to prepare new stoichiometrically-precise heterogeneous bimetallic nanocatalysts through the controlled decomposition of precursor complexes. These studies are leading to a new generation of heterogeneous catalysts that exhibit high activity, high selectivity and long term stability for chemical transformations. These new nanocatalysts permit greater efficiency in chemical transformations leading to cost reductions and fewer waste products.