

## Synthesis and Characterizations of Organic Modified Metal Nanoparticle Catalyst

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Inspired by organic-inorganic hybrid structures found in the biological catalyst, nanostructured metal catalysts modified by organic molecules are investigated in applications of fine chemistry and other chemical processes. While inorganic modifiers have been able to manipulate the catalysis, organic modifiers, with tunable structures and properties, are also supposed to adjust the chemical reactions on the catalysts, such as organometallics and nanoclusters. In this research, we synthesized the gold nanoparticle catalyst using calixarene, macrocyclic organic ligand, and characterized its geometric, electronic, and catalytic properties. Because of the calixarene's rigid structure, the adsorbed calixarene was expected to maintain its molecular structures and geometrically modify the metal catalyst surface. The accessible active sites created by a calixarene ligand layer were measured by the chemisorption method we developed, and exhibited the catalytic activity although the nanoparticle surface was fully saturated with calixarene molecules. In addition, tunable functional groups of the calixarene ligand controlled chemical properties of the metal catalyst to adjust its electronic properties.