# Highly Active Supported Au Catalysts Derived from Novel Au Precursors for Various Catalytic Reactions

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**Keywords**: Supported Au Catalysts; Impregnation Method; Au Precursors; Catalytic Reactions

Gold nanoparticles (Au NPs) are efficient catalysts for various transformations.[1] While the deposition–precipitation (DP) method affords even distribution, it requires large solvent volumes, increasing cost and environmental impact. The impregnation (IP) method is more scalable but often suffers from Au NPs aggregation due to chloride ions. A highly stable, chloride-free *N*-heterocyclic carbene (NHC)–Au precursor was previously reported by our group; however, its reduction at 300 ℃ was incomplete, leaving organic residues that negatively affected catalytic activity.[2]

To overcome these issues, we developed chloride-free and fully reducible NHC-Au and pyridine-Au precursors. Au/$ZrO_2$ catalysts prepared from Au precursors was identified based on transmission electron microscopy (TEM) analysis. Thermogravimetric–differential thermal analysis (TG–DTA) and in-situ X-ray absorption fine structure (XAFS) measurements confirmed that decomposition of the precursors and the complete reduction of Au occurred at around 300 ℃.

We subsequently evaluated the catalytic activity of this class of catalysts in several transformations, including the 1,3-rearrangement of allylic esters, the cyclization of hex-5-ynoic acid, and the Claisen rearrangement, all of which afforded moderate to excellent yields.


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