Gold and Silver Catalysis for Organic Synthesis and Bioconjugation

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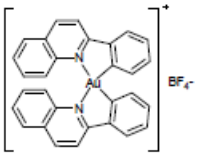
Gold catalysis has attracted significant attention in catalysis research due to its superior reactivity, excellent selectivity and high functional group tolerance. Studies on the use of simple gold salts (e.g. AuCl and $AuCl_3$) as catalysts for organic synthesis have been considerably reported. However, the instability of simple gold salts in catalytic cycles leading to low product turnovers is an unresolved issue.

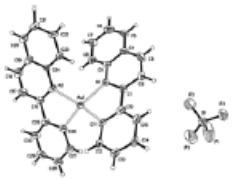
Gold(III) complexes have a square planar geometry with four coordination sites, and in principle the reactivity of the gold(III) reaction centre can be easily fine-tuned by diverse ligand design in a modular approach. However, a significant challenge in the development of gold(III) complexes as efficient catalysts is to strike a balance between stability and reactivity. In general, the stability of gold(III) ions significantly increases upon complexation with ligands. However, stable gold(III) complexes generally exhibit poor catalytic activity.

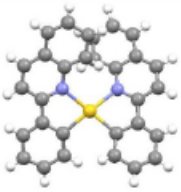
Recently, we found that stable bis-cyclometallated gold(III) catalysts are able to exhibit high catalytic activity in organic synthesis through two novel strategies: (1) formation of coordinatively saturated distorted square planar gold(III) complexes using bulky C,N donor ligands and (2) gold-silver dual catalysis for substrate activation.

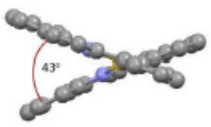
In addition, we have employed cyclometallated gold(III) complexes as chemoselective reagents for site-selective bioconjugation of cysteine-containing peptides and proteins in aqueous medium.



Complex **1**

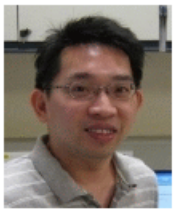






Reference

Ko, H.-M.; Kung, K. K.-Y.; Cui, J.-F.; Wong, M.-K. *Chem. Commun.*, **2013**, *49*, 8869-8871.



Man-Kin Wong (黃文健), b. 1971, The University of Hong Kong (B.Sc.(Hons.) 1993) (Ph.D. 1997), 1999 Research Assistant Professor of The University of Hong Kong, 2008 Assistant Professor of The Hong Kong Polytechnic University. Research Interests: (1) Gold Catalysis and Organocatalysis, (2) Bioconjugation, and (3) Molecular Imaging.