Intramolecular cycloamination of primary amines using gold nanoparticles deposited on fibrillated citric acid-modified cellulose

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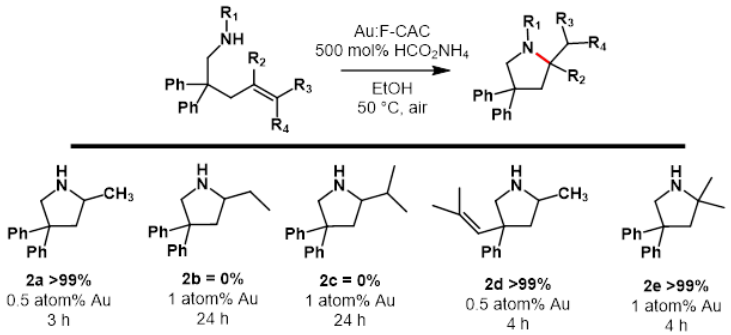
Gold nanoparticles (AuNPs) stabilized by biomacropolymers, such as cellulose and/or chitosan, show unique catalytic properties, and therefore, attracted much attention from the viewpoint of sustainable development. Recently, we have reported a size-selective preparation method of AuNPs deposited on a fibrillated citric acid-modified cellulose (F-CAC),[1] and the thus-prepared Au:F-CAC was applied to aerobic oxidation of benzyl alcohol.[2] The high tolerance of cellulose toward organic solvents allowed us to perform the reactions in various organic solvents. Meanwhile, we have reported that the Lewis-acidic nature of O_2-adsrobed AuNP catalyzed cycloamination reaction of primary amines under aerobic conditions.[3] In this study, we investigated the catalytic activity of Au:F-CAC catalyst toward the cycloamination reaction.

After optimization of reaction conditions, it was found that the intramolecular cyclization of **1a** proceeded in the presence of 0.2 atom% of Au:F-CAC catalyst to give pyrrolidine **2a** in 99% yield after 8 h without any side products. Then, we investigated the substrate scope of this reaction and found that this reaction conditions were sensitive to the steric factors. Contrary to the case of substrates having terminal olefins, the reaction did not proceed in the case of those having crotyl (**2b**) and prenyl (**2c**) groups. Based on this observation, the substrate bearing both allyl and prenyl groups (**2d**) was examined and found that the cyclization occurred at less hindered allyl moiety in complete regioselectivity, showing the unique catalytic activity of the Au:F-CAC catalyst.



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