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Catalytic Activity of Au/TiO₂ and Pt/TiO₂ Nanocatalysts Prepared with Arc Plasma Deposition under CO Oxidation

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We report the catalytic activity of Au/TiO₂ and Pt/TiO₂ nanocatalysts under CO oxidation fabricated by arc plasma deposition (APD), which is a facile dry process with no organic materials involved. Using APD, the catalyst nanoparticles were well dispersed on TiO₂ powder with an average particle size (2~4 nm) well below that of nanoparticles prepared by the sol-gel method (10 nm). We found that the average particle size of the dispersed gold nanoparticles can be controlled by changing the plasma discharge voltage of APD. Accordingly, the amount of loaded gold on the TiO₂ powder increased with increasing discharge voltage, but the specific surface area of the Au/TiO₂ samples decreased. As for catalytic reactivity, Au/TiO₂ showed a higher catalytic activity than Pt/TiO₂ in CO oxidation. The catalytic activity of the Au/TiO₂ samples showed size dependence where higher catalytic activity occurred on smaller gold nanoparticles. The study suggests that APD is a simple way to fabricate catalytically active nanocatalysts.

Keywords: Arc plasma deposition, Au and Pt nanoparticles, Nanocatalyst, CO oxidation