Proceedings of the 5th International Conference on Nanotechnology: Fundamentals and Applications
Prague, Czech Republic, August 11-13, 2014
Paper No. 82

Carbon Monoxide Catalytic Oxidation on Au-Pd/metal Oxide Nanocomposites

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Extended Abstract

Supported noble metal catalysts such as palladium and gold, are of specific interest due to their high catalytic activities in chemical synthesis and environmental remediation. Due to the low cost and high surface area, metal oxide nanoparticles are usually considered as excellent catalyst supports. The choice of metal oxides as the supporting materials will affect the catalytic activity, as well as stability and long term performance of the catalysts (Chen et al., 2012).

Carbon monoxide (CO) catalytic oxidation is considered to be the best model of catalytic reaction. There has been a renewed interest in CO oxidation recently because of its applications in air purification, pollution control, carbon dioxide lasers and fuel-cells systems (Varade et al., 2013).

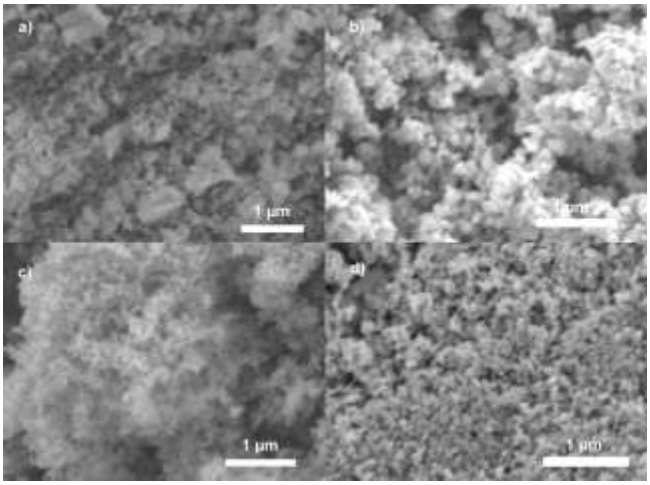

Fig.1 SEM images of different metal oxide nanoparticles (a) CeO_2, (b) ZnO, (c) TiO_2 P25 (d) In_2O_3.

Here we investigated the effect of Au-Pd coating on different meal oxide nanoparticles supports for the catalytic carbon monoxide oxidation. The Au-Pd coating was deposited on to the surface of CeO_2, ZnO, TiO_2 P25 and In_2O_3 nanoparticles by DC sputtering. For the measurement of catalytic activity, carbon monoxide oxidation reaction was carried out under atmospheric pressure in a Hiden CATALAB fixed-

bed system using 30 mg of catalyst from 30°C to 500°C with a heating ramp of 10°C min^{-1}. The reaction mixture consisted of 4% CO, 4% O_2 with the balance helium as the carrier gas. The total flow rate of feed gas was 50 ml/min. Before starting the test, the system was purged with helium at 30 °C for 20 min and then with feeding gas for another 20 min without any initial pretreatment of the catalyst. The outlet gas was analysed by mass spectrometer. The SEM image of different metal oxide nanoparticles are shown on Figure 1. The CO oxidation catalytic activity of different metal oxide nanoparticles are shown on Figure 2. It can be observed that In_2O_3 nanoparticles with and without Au-Pd coating show the best catalytic activity. All the nanoparticles with Au-Pd coating show improved catalytic activity.

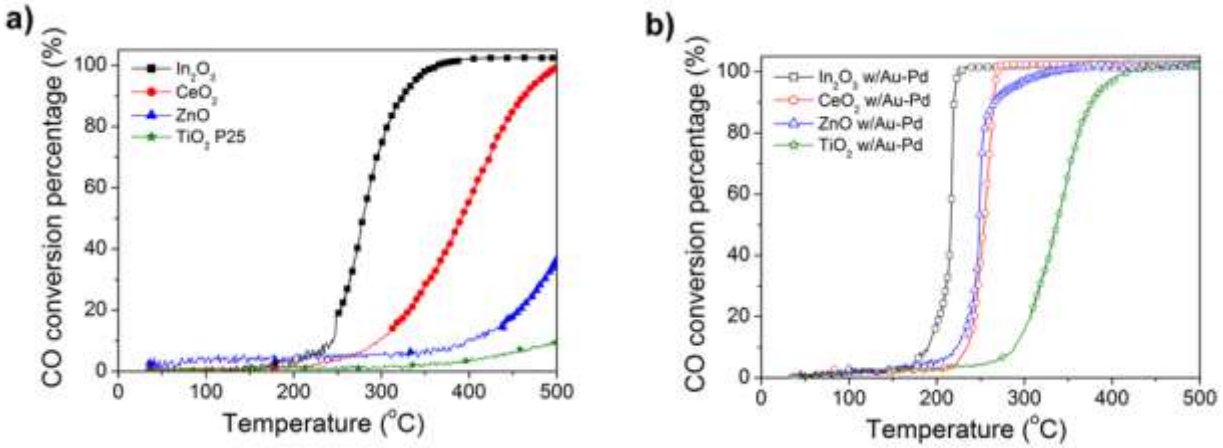

Fig.2 CO oxidation conversion of (a) different metal oxide nanoparticles. (b) different oxide nanoparticles with Au-Pd coating.

The authors would like to thank Prof. K. Y. Chan for his support and valuable suggestions.

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