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## Revealing Strong Metal Support Interaction during CO Oxidation with Metal Nanoparticle on Reducible Oxide Substrates

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Strong metal-support interaction effect is an important issue in determining the catalytic activity for heterogeneous catalysis. In this study, we investigated the support effect and the role of organic capping layers of two-dimensional Pt nanocatalysts on reducible metal oxide supports under the CO oxidation. Several reducible metal oxide supports including CeO<sub>2</sub>, Nb<sub>2</sub>O<sub>5</sub>, and TiO<sub>2</sub> thin films were prepared via sol-gel techniques. The structure, chemical state and optical property were characterized using XRD, XPS, TEM, SEM, and UV-VIS spectrometer. We found that the reducible metal oxide supports have a homogeneous thin thickness and crystalline structure after annealing at high temperature showing the different optical band gap energy. Langmuir-Blodgett technique and arc plasma deposition process were employed to obtain Pt nanoparticle arrays with capping and without capping layers, respectively on the oxide support to assess the role of the supports and capping layers on the catalytic activity of Pt catalysts under the CO oxidation. The catalytic performance of CO oxidation over Pt supported on metal oxide thin films under oxidizing reaction conditions (40 Torr CO and 100 Torr O<sub>2</sub>) was tested. The results show that the catalytic activity significantly depends on the metal oxide support and organic capping layers of Pt nanoparticles, revealing the strong metal-support interaction on these nanocatalysts systems.

**Keywords:** Strong metal-support interaction effect, Pt nanoparticles, Metal oxide thin film supports, CeO<sub>2</sub>, Nb<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, Sol-gel process, Langmuir-Blodgett trough, Arc plasma deposition, CO Oxidation