Effect of Amorphous Alloy CoB on Modifying Pt/TiO₂ Catalyst for Low-temperature Oxidation of Carbon Monoxide

Haiyan Yang, Wenxin Dai*, Zhengxin Ding, Xuxu Wang, Xianzhi Fu
Research Institute of Photocatalysis, State Key Laboratory Breeding Base of Photocatalysis, Fuzhou University, Fuzhou 350002.
*Fax: +86-591-83738608; Tel: +86-591-83779083, E-mail: daiwenxin@fzu.edu.cn

Abstract:
Catalytic oxidation of CO into CO₂ at low-temperature is of great technological value in the purification of the air as well as the removal of CO from H₂ in the development of efficient fuel cell systems. Pt nanoparticles dispersed on metal oxides, such as Pt/Al₂O₃ and Pt/TiO₂, show good performances of catalytic oxidizing CO at a relative high temperature (above 100 °C). In this paper, a study for promoting CO oxidization over Pt/TiO₂ at low-temperature (below 50 °C) was investigated. A Pt/CoB/TiO₂ catalyst modified by amorphous alloy CoB was prepared by the impregnation-wetness-reduction method. The properties of the catalyst were characterized by XRD, TEM, XPS and FTIR, and its activity of oxidizing CO was performed in a fixed-bed flow reactor. It was found, compared with Pt/TiO₂, Pt/CoB/TiO₂ could markedly promote the activity of oxidizing CO at a low temperature. In the case of GHSV=15,000 h⁻¹ and O₂:CO≈1:1 (0.5 vol% CO and O₂ in He streams), the conversion ratio of CO at 50 °C over Pt/CoB/TiO₂ with 1.0wt% Pt and 1.8~2.5 wt % CoB (the atomic ratio of Co and B ≈ 1:1) could increase about 10 times with comparison to that over Pt/TiO₂. However, catalysts Co/Pt/TiO₂ (H₂ reduction), CoB/TiO₂ and Co(Ⅱ)/Pt/TiO₂ modified by other states of Co did not distinctly promote CO oxidation at the same temperature (Fig.1).

Keywords: Low-temperature oxidation of CO; Amorphous alloy CoB; Pt/TiO₂.

![Fig.1. CO conversion ratios over different catalysts at 50 °C](image-url)