Pt-Si Bifunctional Surfaces for CO and Methanol Electro-Oxidation

Bimetallic surfaces offer activity benefits derived from synergistic effects among active sites with uniquely different functions, which is particularly important for the development of highly effective heterogeneous catalysts for specific technological applications, such as energy conversion and storage. Here we report on Pt-Si bulk samples prepared by arc-melting, for the first time, with high activities toward the electro-oxidation of CO and methanol. Increasing the Si concentration on the surface was correlated with the shifts of onset oxidation potentials to lower values and higher activities for CO and methanol electro-oxidation. It is proposed that the reaction on the Pt-Si catalyst could follow a Langmuir-Hinshelwood type of mechanism, where substantially enhanced catalytic activity is attributed to the fine-tuning of the surface Pt-Si atomic structure.

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