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DESIGN OF CO TOLERANT ANODE CATALYSTS FOR POLYMER ELECTROLYTE FUEL CELLS

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It is desirable to operate polymer electrolyte fuel cells (PEFCs) with reformed fuels from methanol or other fuels in gas or liquid phases, particularly for electric vehicle (EV) applications. However, the performance of PEFCs with conventional Pt electrocatalyst is seriously depressed by carbon monoxide poisoning,[1] *i.e.,* H_2 oxidation at Pt is poisoned by only 10 PPM CO,[2] while the content of CO in reformats is about 1 %. To overcome such a problem, we have challenged to develop both of new catalysts for the selective oxidation of CO in reformats [3,4] and new anode catalysts tolerant to the residual CO at least up to 100 PPM CO levels. We will introduce the latter here, which have been examined on binary alloys of platinum with most non-precious elements available in the periodic table.

Each alloy electrode with ca. 0.2 μm thickness was prepared on a glass disk (1-cm diameter) by simultaneous sputtering of corresponding elements under the controlled speeds. Titanium thin film was sputtered to improve an adhesion between the glass and the alloy. The composition of each alloy was in the predicted one with an experimental error less than several percent.....
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We have found several extremely promising alloy combinations and the optimum compositions. A clear difference has also been found in the electrochemical and physical properties between the combinations showed such a synergistic action and others. These results convinced us well how the vacant pair-sites can be prepared.

References

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3. M. Watanabe, H. Uchida, H. Igarashi, and M. Suzuki, *Chem. Lett.*, **1995**, 25.
4. H. Igarashi, H. Uchida, M. Suzuki, Y. Sasaki and M. Watanabe, *Applied Catalysis*, in press.