Ultra high performance of core-shell structured Ir@Pt/C catalyst prepared by a facile pulse electrochemical deposition

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Low platinum catalyst attracts much attention recently due to it may effectively decrease the usage of platinum, and may make the commercialization of PEM fuel cell possible. The core-shell catalyst is recognized as the most important and promising low platinum catalyst, generally, the core-shell catalyst could enhance the utilization of platinum over three times.

In this paper, we reported a core-shell Ir@Pt/C catalyst, which is prepared by covering a thin Pt shell layer on the carbon supported Ir nanoparticles. The loading of Ir and Pt are 30% and 20% respectively. The catalyst shows 3 times higher mass activity towards the anodic oxidation of methanol, and 2.5 times higher mass activity towards the cathodic reduction of oxygen than commercial Pt/C catalyst (the loading of Pt is 40%). It is interesting that the Ib/If for the Ir@Pt/C towards anodic oxidation of methanol is almost same as that of Pt/C catalyst. Furthermore, a large cathodic shift (80 mV) of onset potential for oxidation of the adsorbed CO on the Ir@Pt/C and commercial Pt/C catalyst is observed, indicating that the Ir@Pt/C catalyst may have better ability for the removal of adsorbed CO, or that the Ir@Pt/C catalyst has better tolerance towards the CO.

Fig. A CO-stripping spectra of Ir@Pt/C and commercial Pt/C(JM4100) catalysts; Fig. B Cyclic voltammograms of Ir@Pt/C and JM Pt/C catalysts in 0.1M HClO\textsubscript{4} and 1M CH\textsubscript{3}OH solution at room temperature, and their related column diagrams showing the current densities at 0.6V(vs Ag/AgCl); Fig. C. Linear sweep(LSVs) spectra of Ir@Pt/C and JM Pt/C catalysts in oxygen saturated 0.1M HClO\textsubscript{4} solution, the inset is the column diagrams showing the mass current densities at 0.6V(vs.Ag/AgCl).

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References
