Synthesis and stabilization of intermetallic FePt nanocatalyts with high activity towards oxygen reduction

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A novel synthesis method to prepare carbon supported fct-FePt catalysts with high activity and stability towards electrocatalytic reaction was proposed in this study. The in-situ XRD was employed to monitor structural transformation from fcc to fct. The synthesized fct-FePt/mc catalyst exhibits high activity and stability for oxygen reduction reaction. The enhancement can be attributed to high alloying of Fe with Pt, thereby increase the electron density of Pt. Interestingly, the accelerated degradation test reveals that the fct-FePt/mc catalyst shows positive shift in potential after 10000 potential sweeping. The fct-FePt/mc catalyst shows 1.7-fold mass activity compared to the first cycle and is 21.1-fold higher than that of commercial JM-Pt/C. A more active and stable perfect Pt-skin surface was expected to obtain in fct-FePt structure compared to imperfect fcc-FePt random alloy.

The proposed method can provide not only a physical barrier to inhibit the growth of nanoparticles in the transformation of fcc to fct during high temperature annealing process but also improve the electrochemical stability during potential operations.