A novel chemical approach of spherical shaped Pt/Au decorated on reduced graphene oxide nanocomposite for methanol electro-oxidation

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In this study, we report a general and simple strategy for the synthesis of platinum nanoparticles (PtNPs), highly dispersed on reduced graphene oxide (RGO) substrate with Au nanoparticles. The electrochemically active surface area (ECSA) of the Pt-Au-RGO electrocatalyst is found to be higher than the Pt-RGO electrocatalyst, which is more comparable to a commercial Pt/C catalyst. The obtained ratio of the voltammetric forward peak current to the reverse peak current for the Pt-Au-RGO electrocatalyst (If/Ib = 2.33) is much higher than that of the Pt-RGO electrocatalyst (If/Ib = 1.16). This phenomenon is attributed to the synergistic effects of the Au and the RGO substrate, which help to enhance the electrochemical activity of Pt nanoparticles for methanol oxidation and carbonaceous poisoning resistance. The reported methanol oxidation is found to exhibit excellent electrocatalytic performance, reliability, and stability, surpassing that of several reported modified electrodes that can also be used for platinum-based catalysts in fuel cell applications.