Comments

Comment on "Synthesis of Ordered Intermetallic $PtBi_2$ Nanoparticles for Methanol-Tolerant Catalyst in Oxygen Electroreduction"

Xia et al.[1] have reported methanol tolerance and activity of $PtBi_2$/C ordered intermetallic nanoparticles and their ORR (oxygen reduction reaction) activity. However, the authors present only very limited data and erroneous interpretation to prove its ORR activity. To evaluate the electrocatalytic activity of $PtBi_2$/C, the authors have compared its behavior with that of polycrystalline platinum. In this process, the authors have misinterpreted the curves in Figure 4. The peak marked "oxygen reduction peak" (solid line) in the cathodic scan corresponds not to oxygen reduction reaction but to Pt-oxide reduction. Platinum hydrous oxides formed upon the surface oxidation during the anodic scan undergo reduction to form platinum crystallites. This is a very common phenomenon in electrochemical research literature, for example, ref 2. The discussion on page 5748, paragraph 2, is hence misleading. There are problems with Figure 5 as well. In Figure 5, the $PtBi_2$ electrode is taken to high anodic potentials that favor dissolution of Bi. In our own experience and in accordance with the observations of Blasini et al.,[3] Bi leaches from the electrode surface indicating no significant increase in stability arising from the formation of an intermetallic phase with platinum. However, with the current sensitivity employed by the authors in their CV measurements, discerning such observations is difficult. In addition, when the oxygen reduction current values are compared (Figure 4 and Figure 5b), the currents obtained for $PtBi_2$/C are much lower than those for Pt/C. This means that $PtBi_2$/C is not as active as Pt/C. Here, there is no noticeable change observed in the "faradic" part of the current in the cathodic scan on purging with oxygen or nitrogen (Figure 5a−c). There are ambiguities in the presented data. In summary, the electrocatalytic reaction is misinterpreted and is not fully characterized in this paper, thus underestimating the weight of the electrocatalysis part in reporting this work.

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