Preparation of PtRu/C Electrocatalysts by Borohydride Reduction for Methanol Oxidation in Acidic and Alkaline Medium

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PtRu/C electrocatalysts were performed according to the borohydride reduction method and characterized by X-ray diffraction (XRD), energy dispersive analysis (EDX), transmission electron microscopy, cyclic voltammetry (CV) and polarization curves in alkaline and acidic medium. The X-ray diffraction (XRD) of PtRu/C showed Pt peaks attributed to the face-centered cubic (fcc) structure and a shift in Pt(fcc) peaks indicated that Ru was incorporated into Pt lattice. TEM results showed mean particles sizes in the range of 2.0-4.0nm for all electrocatalysts prepared: therefore, the borohydride reduction process was considered effective for the preparation of PtRu/C electrocatalysts with a different atomic ratio. The activity for the methanol oxidation in acidic and alkaline media was investigated at room temperature, by cyclic voltammetry and chronoamperometry. Cyclic voltammetry and chronoamperometry studies showed that PtRu/C (50:50) had superior performance for methanol oxidation, compared with other electrocatalysts prepared considering acidic and alkaline studies. The currents values observed for alkaline media were higher than those observed for acidic media. Polarization curves, also, showed PtRu/C (50:50) with superior performance for methanol oxidation, when compared with Pt/C, and this improvement of performance could be associated with the occurrence of the bifunctional mechanism and electronic effect.

Keywords: Borohydride reduction process, PtRu/C, methanol electro-oxidation, alkaline medium, acidic media, polarization curves

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