Carbon Supported Mono- and Bi-Metallic Dispersed Thin Film Catalysts for Oxygen Electro-Reduction Reaction in Acid Medium

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The present study reports the use of mono- and binary-metal thin film deposits of Pt, Cu, Ru and Pd dispersed over carbon electrode as electro-catalysts for oxygen reduction. The metals are sequentially electrodeposited on the carbon electrode from their aqueous solutions using the potentiostatic technique. The electrode surface characterization was carried out by scanning electron microscopy (SEM), X-ray diffraction (XRD) and energy dispersed X-ray (EDX). The micrographs of SEM analyses showed that the thin films of the various deposits are located at the electrode surface in the nano-scale range. Linear sweep voltammetry was used to investigate the electrode performance towards oxygen reduction in H₂SO₄ solution in the absence and presence of H₂O₂. The results indicated that metal deposits and platinum-metal modified carbon electrodes have shown superior electro-catalytic activity toward oxygen reduction reaction (ORR) as shown by the relative increase in the peak current density values of oxygen reduction.

Keywords: Oxygen reduction, Dispersed electrodes, Pt, Pt-Cu, Pt-Pd.

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