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Electro-deposition of Pd on Carbon paper and Ni foam via surfacelimited redox-replacement reaction for oxygen reduction reaction

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Abstract

Pd nanostructured catalysts were electrodeposited by surface-limited redox replacement reactions usingthe electrochemical atomic layer deposition technique. Carbon paper and Ni foam were used as substratesfor the electrodeposition of the metal. Supported nanostructured Pd electrodes were characterized usingelectrochemical methods and scanning electron microscopy. Carbon paper and Ni foam produced goodquality deposits with some agglomeration on Ni foam. The EDX profiles confirmed the presence of Pdparticles. Cyclic voltammograms of the electrodeposited Pd on substrates showed features characteristicof polycrystalline Pd electrodes. In the acidic electrolyte a very weak oxygen reduction reaction (ORR)activity was observed on Pd/Carbon paper electrode when compared to Pd/Ni foam electrode. The Pd/Nifoam electrode showed improved ORR activity in alkaline medium.