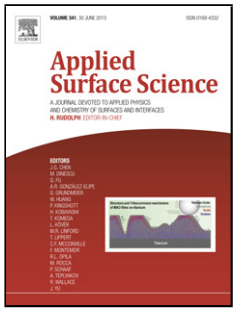

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SINGLE STEP RADIOLYTIC SYNTHESIS OF IRIDIUM NANOPARTICLES ONTO GRAPHENE OXIDE

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Abstract

In this work a new approach to synthesize iridium nanoparticles on reduced graphene oxide is presented. The nanoparticles were directly deposited and grown on the surface of the carbon-based support using a single step reduction method through gamma irradiation. In this process, an aqueous isopropanol solution containing the iridium precursor, graphene oxide, and sodium dodecyl sulfate was initially prepared and sonicated thoroughly to obtain a homogeneous dispersion. The samples were irradiated with gamma rays with energies of 1.17 and 1.33 MeV emitted from the spontaneous decay of the ^{60}Co irradiator. The interaction of gamma rays with water in the presence of isopropanol generates highly reducing species homogeneously distributed in the solution that can reduce the Ir precursor down to a zero valence state. An absorbed dose of 60 kGy was used, which according to the yield of reducing species is sufficient to reduce the total amount of precursor present in the solution. This novel approach leads to the formation of 2.3 ± 0.5 nm Ir nanoparticles distributed along the surface of the support. The oxygenated functionalities of graphene oxide served as nucleation sites for the formation of Ir nuclei and their subsequent growth. XPS results revealed that the interaction of Ir with the support occurs through Ir-O bonds.