

Abstract Submitted
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Semiconductor-metal transition of Se in Ru-Se Catalyst Nanoparticles P.K. BABU, Department of Physics, Western Illinois University, ADAM LEWERA, Department of Chemistry, Warsaw University, Poland, ERIC OLD-FIELD, ANDRZEJ WIECKOWSKI, Department of Chemistry, University of Illinois at Urbana-Champaign — Ru-Se composite nanoparticles are promising catalysts for the oxygen reduction reaction (ORR) in fuel cells. Though the role of Se in enhancing the chemical stability of Ru nanoparticles is well established, the microscopic nature of Ru-Se interaction was not clearly understood. We carried out a combined investigation of ^{77}Se NMR and XPS on Ru-Se nanoparticles and our results indicate that Se, a semiconductor in elemental form, becomes metallic when interacting with Ru. ^{77}Se spin-lattice relaxation rates are found to be proportional to T , the well-known Korringa behavior characteristic of metals. The NMR results are supported by the XPS binding energy shifts which suggest that a possible Ru \rightarrow Se charge transfer could be responsible for the semiconductor \rightarrow metal transition of Se which also makes Ru less susceptible to oxidation during ORR.

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