# Microwave-Assisted Synthesis and Electrocatalytic Activity of Pt-$CeO_2$ Nanoparticles Supported on Carbon Nanotubes

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## ABSTRACT

Carbon nanotubes have been successfully used as support for the dispersion and stabilization of metal and oxide nanoparticles due to their large chemical active surface and thermal stability. Among many techniques to produce these composites, microwave processing has emerged as a novel method for this purpose. Microwave-assisted deposition offers the advantage of uniform heating of the sample resulting in a better particle size control and distribution of the metal nanoparticles produced as well as a substantial synthesis time reduction. The use of surfactants as stabilizers is an important parameter to achieve uniform distribution and size control of the nanoparticles on the surface of the carbon nanotubes.

In this work, we study the deposition of Pt-$CeO_2$ nanoparticles on MWCNTs by microwave irradiation and its application as fuel cell electrocatalyst. Dioctil sodium sulfosuccinate (AOT) was used as surfactant. $NaBH_4$ was used as a reducing agent. MWCNTs were produced by spray pyrolysis of alpha-pinene and purified by a conventional acid treatment. The microwave synthesis was performed in a Synthos 3000 microwave reactor. The produced composites were characterized by HRTEM, Raman spectroscopy, TGA and XRD. Electrochemical experiments were carried out in a conventional three cell electrode to evaluate the electrochemical active area and the oxygen reduction reaction. The Pt-$CeO_2$/MWCNTs electrochemical results will be discussed and compared with traditional Pt/C.

*Keywords:Pt-$CeO_2$ /MWCNTs composite, microwave synthesis, oxygen reduction reaction.*