P-22: Sonochemical Synthesis of Molybdenum Oxide Nanoparticles for Decoration of SOFC Anode Powders

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The operation of solid oxide fuel cells under steam or dry reforming conditions depends on the catalytic abilities of their anode materials. When natural gas (NG) reacts with the anode side, the reforming reactions are expected to convert the gas into hydrogen which will be used for the fuel cell anodic reaction. Carbon and sulphur contained in NG tends to lower the reforming rate. Thus, C and S tolerant anodic materials are important for promoting the reforming reaction. Such materials are obtained by addition of certain metal nanoparticles (M-NP) such as Au, Ag, Cu and Mo, W, Re, for S and C tolerance respectively (Gong et al. 2007; Gavrielatos et al. 2008).

We used two methods to produce decorated NiO/GDC anode material using ultrasonification. In the first method, three-hour experiment, on average, is carried out to produce molybdenum oxide, in Decahydronaphthalene (Decalin), with the aid of a tapered microtip, which offers power equal to $100 W/cm^2$. The nanoparticles are collected via centrifuge and are ultrasonified together with NiO/GDC powder, for another three hours. (Gedanken 2004). In the second method, the NiO/GDC powder is suspended in the solution of the Molybdenum precursor, in Decalin. Both NiO/GDC and molybdenum precursor are mixed and treated ultrasonically for three hours, using again the above mentioned microtip. Different analytical methods such as DLS, SEM, TEM and XRD have been employed in order to clarify yield and size of the nanoparticles produced by these two approaches as well as to estimate the percentage of molybdenum on NiO/GDC and the quality of the decoration process.

Acknowledgements

The present work is part of the ROBANODE Project, funded by the European Union (EU) 7th Framework Programme (FP7) Fuel Cells and Hydrogen Joint Undertaking (FCH-JU).

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