Wet-chemical synthesis of CeO_2 for electrochemical applications

L. P. R. Moraes[a], J. Mei[b], D. Marani[c], F. C. Fonseca[a], Z. Sun[b]

[a] Instituto de Pesquisas Energéticas e Nucleares, 05508-000, São Paulo, SP, Brazil
[b] Queensland University of Technology, Brisbane QLD 4000, Australia
[c] Universidade Federal do ABC, 09210-580, Santo André, SP, Brazil

Nanostructured metal oxides have been extensively studied in the last decades for their physicochemical properties, which depend on the size and shape of their nanostructures. The same chemical element or compound can exhibit different properties in different shapes and dimensions. Metal oxides are a class of inorganic compounds very important in many areas of materials science due to their unique properties that enable them to have a wide range of applications, such as sensor, catalysis, ceramics, absorbents and superconductors. They are particularly attractive for electrochemical applications due to their low molecular weight, favorable electrochemical properties and low toxicity, and have been extensively studied for the development of new energy conversion and storage systems, especially because of the higher electrode surface area, leading to higher charge/discharge rates, and their rich redox reactions involving different ions. Particularly, CeO_2 is a promising metal oxide as it can present defects such as oxygen vacancies which play an important role for catalytic, magnetic and electrochemical properties. In this work, different nanostructures of CeO_2 were synthesized by the self-assembly approach, from molecular precursors, using Pluronic P123 as surfactant and ethylene glycol as co-surfactant in ethanol solvent in a solvothermal system. The effect of different synthesis parameters on the morphology, crystallite size and electrochemical properties were investigated via various analytical techniques. The experimental results indicated that the synthesis parameters, such as temperature, aging time and chemicals concentration, strongly influences the morphology and sizes of CeO_2, thus enabling the intentionally design of different nanomaterials.

Symposium S

Topic S02

Preference for oral presentation

Presenter: Leticia Moraes - leticia.porasreisdemoraes@qut.edu.au

#

#