Hydrothermal synthesis of triangular $CeCO_3OH$ particles and photoluminescence properties

Md. Hasan Zahir[a*], Md. Abdul Aziz[b]

[a,]Center of Research Excellence in Renewable Energy, Research Institute, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia, * Researcher at K.A.CARE Energy Research & Innovation Center at Dhahran

[b]Center of Research Excellence in Nanotechnology, King Fahd University of Petroleum and Minerals, Dhahran 31261, Saudi Arabia

ABSTRACT

In recent years, cerium compounds have been widely used in catalysis and fuel cells, and as chemical materials and luminescent materials because of the specific 4f energy levels of Elemental Ce [1]. In particular, cerium carbonate hydroxide ($CeCO_3OH$) is an important functional material that has attracted much attention because of its novel electronic properties, Optical properties, and chemical characteristics. Recently, $CeCO_3OH$ with various morphologies has been synthesized by using several different approaches such as the self-assembly, sonochemical, hydrothermal, and micro wave-assisted hydrothermal routes. It is well established that Ru species in CeO_2 (RC) a reactive in many catalytic reactions. However, a detailed study of RC interactions has not yet been carried out. Wang et al. have synthesized RC catalysts with various compositions and a unique CeO_2 morphology by varying the Ru loading. In this work Ru/CeO_2 [RC] and Ru/CeO_2/ethylene glycol (EG) [RCE] nanoparticles were produced by performing a simple hydrothermal reaction at 200^oC for 24h and found to have two distinct morphologies. The room temperature photoluminescence of the RC and RCE nanoparticles and of RCE calcined at 600^oC [RCE-600] was also investigated.

Acknowledgement

The author would like to acknowledge the support provided by the Deanship of Scientific Research (DSR) at King Fahd University of Petroleum & Minerals (KFUPM) by funding this work through project No. IN-171036. The author also would like to acknowledge the support provided by the King Abdullah City for Atomic and Renewable Energy (K.A.CARE).