

Thamrong Rakthin 2009: Preparation of Rare Earth-doped Ceria Powders from Metal Complex Used as An Electrolyte in Solid Oxide Fuel Cells. Master of Engineering (Materials Engineering), Major Field: Materials Engineering, Department of Materials Engineering. Thesis Advisor: Assistant Professor Apirat Laobuthee, Ph.D. 82 pages.

CeO_2 , $\text{Ce}_{1-x}\text{Gd}_x\text{O}_{2-\delta}$, and $\text{Ce}_{1-x}\text{Sm}_x\text{O}_{2-\delta}$ (where $x = 0.10, 0.15$, and 0.20) powders can be prepared via metal complex method. This method offers the advantages of easy, inexpensive, and straightforward to produce high purity and homogeneity products. Based on FTIR and ESI-MS techniques, two possible structures of cerium complexes can be proposed as four coordinated cerium ion binding to TEA molecule $[\text{Ce}(\text{TEA})]$ and five coordinated cerium ion with TEA and Cl⁻ ligands $[\text{Ce}(\text{TEA})\text{Cl}]$. In addition, doped cerium complexes can be prepared via metal complex method. The TGA/DSC results showed that the appropriate temperature for calcining metal complexes into ceramic powders is started at 600°C. The effect of calcination temperatures revealed that the crystallite size and average particle size are increased with increasing calcination temperature while specific surface area decreased. From impedance spectroscopy, $\text{Ce}_{0.85}\text{Gd}_{0.15}\text{O}_{2-\delta}$ and $\text{Ce}_{0.90}\text{Sm}_{0.10}\text{O}_{2-\delta}$ give the largest ionic conductivity as 0.0302 and 0.0284 S/cm, respectively.

Student's signature

Thesis Advisor's signature

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