

Effect of carbonate based co-dopants on structural and electrical properties of neodymium doped ceria electrolytes for solid oxide fuel cells

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Neodymium doped ceria electrolyte has been synthesized using sol-gel route in fuel cells. Nitrate precursors were used. DC conductivity values for two compositions NDC20 and NDC25 were found to be $7.97 \times 10^{-5} \text{ Scm}^{-1}$ and $3.67 \times 10^{-5} \text{ Scm}^{-1}$, respectively at 650 °C. Smaller particle offered better conductivity which was achieved by synthesizing in acidic medium. The effect of various co-dopants on conductivity of neodymium doped ceria was investigated. Among the rare-earth co-dopants, SNDC performed better than YNDC in conductivity. Carbonate addition was studied by including 10 and 20 vol.% K₂CO₃ in NDC electrolyte. The resulting residual amorphous phase in NDC significantly improved the conductivity value from $7.97 \times 10^{-5} \text{ Scm}^{-1}$ to $3.26 \times 10^{-4} \text{ Scm}^{-1}$. Acknowledgments: This work was supported by the National Research Foundation (NRF) grant funded by the Korean government (MSIT) (No. NRF-2017R1E1A1A03070713), and Korea Ministry of Environment (MOE) as Graduate School specialized in Climate Change.