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Abstract
Abstract
In this study, the Samarium -doped ceria (SDC) powders are prepared by using a low-temperature hydrothermal technique, with taken ammonium cerium nitrate, Samarium oxide and urea as the raw materials. We made well crystallinity SDC powders by low-temperature hydrothermal method, Furthermore, the formed powders were diet with pressure of 300MPa and sintered at 1500℃for 2 hours, are used to the electrolyte of SOFCs operating at intermediate temperature.
The crystallinity would be become lager and the compostion become more random when the hydrothermal treatment temperature higher than 140℃. When hydrothermal temperature are more than 160℃, it have a impure crystalline phase, by JCPDS analyzed to determine it is a crystalline phase of Sm2O3. The SDC powder formed with using hydrothermal temperature at 140℃, and after sintered sinter at 1500℃-2h, the relative density of sinter body is near 98%. The conductivity con reach 7.0×10-2 Scm-1(800℃). On the other hand, reducing operated temperature to 750℃ even 700℃, it can keep the good conductivities (about 5.0×10-2 Scm-1 and 3.8×10-2 Scm-1,respectively).
When hydrothermal treatment time over 10 hours, the impure phase of SDC also obtained in crystalline structure. The SDC powders prepared with hydrothermal treatment time at 5~7 hours, the composition of these powders are more uniformly and close to the stoichiometry of start solution. The relative densities are all above 95% as during any hydrothermal treatment time conditions.
The crystalline sizes decrease with increasing of the concentration of urea. When the powder of prepared process has not added precipitation agent like urea, the product is pure cerium oxide, because of the Sm3+ is not doped into grain lattice of cerium oxide during hydrothermal treatment. The composition of SDC powders with prepared in condition of urea concentration is 0.7M is more uniformly. The sinter body carry out 2.1M urea to prepared SDC powders via sintered 1500℃-2 hours exhibit a large lumber of pores in the electrolyte, and the relative density only has 92%. Therefore, the relative density were to reach 98% as the electrolyte prepared by 0.7M urea condition.
The sinter body will more than dense with increasing of sinter temperature. The conductivity at operated temperature at 800℃ to reach 7.0×10-2 Scm-1 as sintering temperature at 1500℃ and 2 hours. Furthermore, the sinter temperature reduce to 1400℃ and 1300℃ the conductivities also

have 3.4×10-2 S/cm and 3.0×10-2 S/cm, respectively.
Keyword: solid oxide fuel cell, SDC electrolyte, hydrothermal method, nanoparticle
Advisory Committee Wo Chang Wu - advisor

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