spheres show a better separation of electrons and holes under an excitation light due to the light scattering produced inside. In addition, the microstructural characteristics of these phosphors such as the surface features and the size properties play a key role in the fluorescent applications of these luminescent materials, which can be controllably altered through different synthetic methodologies and reaction condition. For those reasons, we have developed a simple synthesis method in order to obtain hollow microspheres of Tb^{3+}-doped $LaPO_4nH_2O$ and Tb^{3+}-doped $LaPO_4$ through one-pot hydrothermal synthesis without using any template. Commercially available $La(NO_3)_3 6H_2O$, $Tb(CH_3CO_2)_3 xH_2O$, $H_6P_4O_{13}$ were used in the synthesis. Our resulting products were characterized using a wide battery of analytical techniques such as XRD, FT-IR, DTA-TG, FE-SEM-EDX and TEM-EDX. Highly-uniform, well-shaped microspheres were readily obtained as Tb^{3+}-doped $LaPO_4nH_2O$ (rhabdophane) and Tb^{3+}-doped $LaPO_4$ (monazite) depending on the final thermal treatment.

(CMCEE-H1-P004-2015) YSZ Thin Films Prepared from a Novel One-pot Process by Microwave Forced Hydrolysis and Electrophoretic Deposition (EPD)

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A fuel cell transforms chemical energy directly into electrical energy with high efficiency and low emission of pollutants. However, before fuel-cell technology can gain a significant share of the electrical power market, important issues have to be addressed. These issues include optimal choice of fuel and the development of not only novel or improved materials but also novel or improved processing techniques in order to obtain coatings with the adequate features. This work aims at preparing YSZ thin films by the development of a novel, fast, soft, cheap and environmentally friendly process that match the microwave forced hydrolysis synthesis with the electrophoretic deposition (EPD). YSZ suspensions were obtained by a microwave-assisted hydrothermal route in a sealed-vessel microwave reactor. Those suspensions were deposited on stainless-steel substrates in order to obtain thin films. XRD and Raman spectroscopy were used in order to check the phase structure of the resulting nanoparticles. AFM and FEG-SEM were used to study the microstructure of the sintered films. The resulting films were dense and homogeneous and showed different thicknesses depending on either the current density or the deposition time.

(CMCEE-T1-S1-P005-2015) Adsorption of siloxane for biogas cleanup using UCT mesoporous adsorbent

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Removal of the impurities (e.g. siloxane) in the biogas, an important sustainable alternative energy source, is necessary to increase the efficiency of energy production and prevent severe damage to operating units. Excellent ceramic adsorbents, such as silica, zeolite, alumina, and active carbon, have been investigated for siloxane removal. In this study, we designed and synthesized mesoporous UCT materials, including mesoporous silica, aluminosilicate, alumina, and carbon, to study siloxane adsorption under dry and moisture conditions. The adsorption experiments with synthesized materials are compared to those with corresponding commercial adsorbents. Under dry conditions, mesoporous silica and mesoporous alumina (calcined at 500 °C for 1 h) have better performance than commercial silica and alumina, respectively. Under moisture conditions, mesoporous silica (synthesized with CTAB and SDS) and mesoporous aluminosilicates have better performance than commercial silica and ZSM-5, respectively. Moreover, adsorption capabilities of the mesoporous adsorbents are optimized by changing surfactant, dopant amount, calcination temperature, heating rate, and time. The surfactant type, aluminum dopant amount, and pore volume are important synthesis parameters in improving adsorption capability of the UCT mesoporous materials. These systems can be used in clean up of gases used for fuel cell applications.

(CMCEE-T1-S1-P006-2015) Improved Densification and Ionic Conductivity of Sr- and Mg-doped Lanthanum Gallate

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Sr- and Mg- doped lanthanum gallate is one of the most promising solid electrolyte and electrode components for solid oxide fuel cells operating at intermediate temperatures (600-8000C), due to its high ionic conductivity and stability over a wide range of oxygen partial pressures. In this work the composition $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}O_{3-\delta}$ was prepared by solid state reaction under diverse processing conditions. A successful approach has been established for obtaining lanthanum gallate solid electrolytes with enhanced sintering performance and improved oxide ion conductivity. The main experimental parameters investigated were the calcination and the sintering profiles. Results on X-ray diffraction show negligible secondary phases, such as $SrLaGaO_4$, $La_4Ga_2O_9$ and $SrLaGa_3O_7$ along with free MgO, which was observed by scanning electron microscopy. The apparent density was higher than 97% of the theoretical value for all experimental conditions and sintering temperatures of 14500C or higher. The contents of secondary phases were found to depend on the processing route. The ionic conductivity of grains and grain boundaries is higher for specimens calcined at 12500C and sintered at 15000C for 6 h. The average grain size reached 13.2 μm for the optimized processing route and the total ionic conductivity at 3600C attained $1.3x10^{-4}$ S.cm^{-1}.

(CMCEE-T1-S1-P007-2015) Preparation and characterization of gadolinium doped barium zirconate for SOFC

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High proton conductivity perovskites can be utilized in many important applications. In this work gadolinium doped barium zirconate ([gadolinium oxide] = 0, 5, 10, 15 and 20% mol) was prepared by Pechini method from nitrates precursors. The powders were studied by simultaneous thermal analysis, X-ray diffraction, and scanning electron microscopy. These powders were then uniaxially pressed at 1 ton/cm^2 in cylindrical discs (diameter = 10 mm and thickness ~ 1 mm) and theirs geometrical densities were determined. These pellets were sintered at temperatures of 1623 K/1 h with and without amounts of boric acid as sintering aid, follow by geometrical and Archimedes density measurements. Phase analysis was carried out by X-ray diffraction, and fracture and polished samples surfaces were observed in scanning electron microscopy. The parallel faces of each sample was painted with platinum paste and electrical characterized by impedance spectroscopy in the frequency range from 32 MHz to 1 Hz, under static air and standard mixture (3% hydrogen/97% nitrogen) flow, in the RT up to 1273 K. The main results indicate that dense (>96 % of theoretical density) barium zirconate perovskite phase was obtained for samples liquid phase sintered.

(CMCEE-T1-S1-P008-2015) Energy Efficient Ceramic Electrolyte fuel cell system with enhanced Power Density for Intermediate Temperature – Solid Oxide Fuel Cell application

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Remarkably high electrical efficiency at attractive economics can be achieved by using $Ce_{0.8}Gd_{0.2}O_{1.2}$ (Gadolinium Doped Ceria GDC) as solid electrolyte in IT-SOFC (Intermediate Temperature-Solid Oxide Fuel Cell). Solid oxide electrolyte samples were synthesized employing dry pressing technique and were sintered at different temperatures ranging from 1350C to 1600C. High densification with relative density as high as 93.93% was achieved. X-Ray Diffraction (XRD) pattern for sintered GDC samples reveals the presence of crystalline crystallographic system of cubic phases with crystal orientation such as (111), (200), (220), (311), (222), (400), (331), (420), thereby ensuring productive sintering. Beyond 1550°C, SEM images unveiled distorted hexagonal edges with exaggerated and bi-modal grain growth. Impedance Analysis samples indicates the ionic conductivity increases with increase in sintering temperature. Exceptionally high power density of 747mW/cm^2 at 800°C (cell

*Denotes Presenter