MECHANOCHEMICAL SYNTHESIS OF OXIDE PEROVSKITES AS EARTH-ABUNDANT ELECTRODES FOR SYMMETRICAL SOLID OXIDE CELLS

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ABSTRACT

The implementation of mechanochemical processing on the solid-state synthesis of perovskite oxides has been investigated for the preparation of $La_xSr_{1-x}Ti_yMn_{1-y}O_{3-\delta}$ electroceramics. The morphology, crystal structure, conductivity and high temperature characteristics of these powders have been studied with X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM), energy-dispersive X-ray spectroscopy (EDS), transmission electron microscopy (TEM), thermogravimetric analysis (TGA), X-ray photoelectron spectroscopy (XPS) and other spectroscopy techniques. All compounds were obtained as pure perovskites, with a distorted symmetry depending on the elemental doping and annealing temperature. The electrochemical behavior of pure phase oxide perovskites was observed with electrochemical impedance spectroscopy (EIS) and linear scan voltammetry (LSV) at different temperatures and environments (air for oxidizing and hydrogen for reducing), while powdered composites with yttria-stabilized zirconia (YSZ) were screen printed on commercial YSZ disks, in a symmetric solid oxide cell (s-SOC) architecture and tested as oxygen electrodes at different temperatures. Interesting relationships were obtained by combining the physicochemical properties of the different samples with their electrochemical behavior as electrode components.

KEYWORDS: Electrodes, Mechanochemistry, Mixed conductors, Perovskites, Solid oxide cells

REFERENCES

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