**Influence of synthesis route on morphology and conduction behavior of proton conducting electrolytes with perovskite-structure**

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Solid oxide fuel cells (SOFCs) are among the most promising devices running on renewable energy. Тhe electrolyte as a part of the cell plays a crucial role in the cell function. The main requirements for electrolyte materials are: fast proton or mixed conductivity; chemical and mechanical stability in temperature range of operation. These characteristics depend largely on the composition and structure of the material, which in turn are highly sensitive to the method of synthesis.

In search of fast conductive electrolytes operating at intermediate temperatures i.e. 300-700 oC, materials with perovskite structure and composition BaCe0.8-xTixLa0.2O3-δ, 0 ≤ x ≤ 0.3 mol% are obtained by two different synthesis approaches: grinding and chemical precipitation reaction. Both regimes are finalized with high temperature sintering for 12 hours. The crystallographic structure is analyzed by X-ray diffraction. In order to reveal any possible differences on the molecular level, their structural arrangement was studied by ATR-Infrared spectroscopy. The results clearly show difference in the spectral characteristics of the materials prepared by the two methods. In addition, the morphology of the samples was studied. The conductivity is examined by electrochemical impedance spectroscopy. This method is very precise and sensitive to all changes that can occur in a material like structural transformations by varying the temperature or conditions (humidity). All the performed investigations in the present work show clear correlation between composition, structure and method of preparation.

**Keywords :** materials characterization, dielectric materials, energy materials