Structural and thermoelectric characterization of Ba(II) substituted LaCoO$_3$ perovskite materials obtained by polymerized gel combustion method

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Polymerized gel combustion method was used to prepare Ba substituted lanthanum cobaltite powders as suitable candidate for nanostructured oxide thermoelectric materials. Because of the poor complexing ability of Ba(II) ions and the dramatic solubility changes of Ba(II) compounds, some modification were applied during the polymerized gel generation in order to obtain homogeneously mixed system without recrystallization or precipitation of Ba(II) species. High purity metal nitrates, polycarboxylic acid and diol were used as precursors and complexing agent/fuel, respectively. Homogeneous gels were decomposed under air at 150°C ignition temperature in a hot box oven. As the auto combustion took place, brownish, amorphous xerogels were obtained. The xerogels were calcined at 700°C for 5 hours in air, resulting in shiny black powders. The products were afterwards investigated by XRD, TG, FT-IR, low temperature (BET) N$_2$-adsorption, hot gas extraction and SEM/HR-TEM/EDX. The calcined nanocrystalline powders were compacted under uniaxial pressing followed by conventional sintering in air. The thermoelectric properties of the Ba-doped samples were finally determined and the figure of merit was calculated.