

Effect of sol-gel and solid-state synthesis techniques on structural, morphological and thermoelectric performance of $\text{Ca}_3\text{Co}_4\text{O}_9$

A.K. Królicka, M. Piersa, A. Mirowska, M. Michalska



www.elsevier.com/locate/ceri

PII: S0272-8842(18)31088-5
DOI: <https://doi.org/10.1016/j.ceramint.2018.04.215>
Reference: CERI18132

To appear in: *Ceramics International*

Received date: 19 April 2017
Revised date: 24 April 2018
Accepted date: 25 April 2018

Cite this article as: A.K. Królicka, M. Piersa, A. Mirowska and M. Michalska, Effect of sol-gel and solid-state synthesis techniques on structural, morphological and thermoelectric performance of $\text{Ca}_3\text{Co}_4\text{O}_9$, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.04.215>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**Effect of sol-gel and solid-state synthesis techniques
on structural, morphological and thermoelectric performance of $\text{Ca}_3\text{Co}_4\text{O}_9$**

A. K. Królicka^{1*#}, M. Piersa², A. Mirowska², M. Michalska^{2*#}

¹Institute of Physics PAS, Al. Lotników 32/46, 02-668 Warsaw, Poland

²Institute of Electronic Materials Technology, Wólczyńska 133, 01-919 Warsaw, Poland

Abstract:

Two methods of obtaining calcium cobalt oxide ($\text{Ca}_3\text{Co}_4\text{O}_9$) thermoelectric materials were studied: (I) solid state synthesis (SS) followed by high-energy ball-milling (HEBM) and (II) modified sol-gel method (SG). The obtained powders were heated at 900°C for 12 hours. They were subsequently compacted using spark plasma sintering (SPS). The crystal structure and morphology were characterized by X-ray diffraction and scanning electron microscopy. The calculated average crystallite sizes, before and after SPS, alter from 43 to 61 nm and from 38 to 41 nm, for the SS and SG powders, respectively. XRD studies of the obtained powders revealed presence of Co_3O_4 secondary phases, which turned into metallic cobalt after SPS. Thermoelectric measurements of sintered samples were performed in the range, 50-500°C. The maximum Seebeck coefficient is 120 $\mu\text{V/K}$ and 110 $\mu\text{V/K}$, for the SS and SG

* Corresponding authors:

Aleksandra K. Królicka, tel. (+48 22) 843-66-01; fax: (+48 22) 843-09-26; e-mail: aleksandrakrolicka.ak@gmail.com
Dr. Monika Michalska, tel. (+48 22) 835-30-41; fax: (+48 22) 864-54-96; e-mail: monika.michalska83@gmail.com

[#] These authors contributed equally.

Download English Version:

<https://daneshyari.com/en/article/7886427>

Download Persian Version:

<https://daneshyari.com/article/7886427>

[Daneshyari.com](https://daneshyari.com)