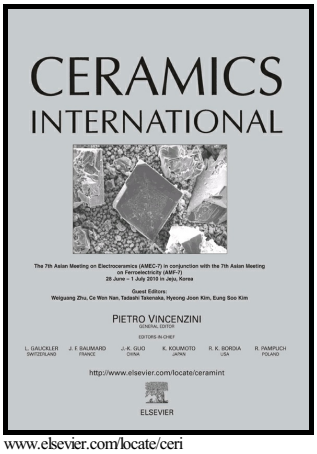

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Effect of sol-gel and solid-state synthesis techniques on structural, morphological and thermoelectric performance of $Ca_3Co_4O_9$

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Abstract:

Two methods of obtaining calcium cobalt oxide ($Ca_3Co_4O_9$) 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 μV/K and 110 μV/K, for the SS and SG

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