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A comparative study on the thermoelectric properties of $CoSb_3$ prepared by hydrothermal and solvothermal route

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Abstract

Solvothermal methods are generally used to synthesize $CoSb_3$ skutterudite thermoelectric materials. Hydrothermal methods are seldom employed because of the hydrolytic reactions of Sb^{3+}. However, the hydrothermal method is safer, more cost-efficient and environmentally friendly than solvothermal routes. Here, coordination complexes are used as the reactant to avoid hydrolytic reactions of Sb^{3+} in a $CoSb_3$ skutterudite nanomaterial preparation via a hydrothermal route and their thermoelectric properties were compared to those of the materials prepared by the solvothermal method. The electrical conductivity and Seebeck coefficients of the obtained $CoSb_3$ skutterudites were tested by a four-probe technique. The thermal conductivities were measured with a thermal diffusivity system using Pyroceram as a reference sample. The thermoelectric properties of the $CoSb_3$ skutterudite were investigated in the temperature range of 300–800 K. It was found that the samples prepared by hydrothermal methods possess obvious advantages over those synthesized via solvothermal routes. The Seebeck coefficients of former material were

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