

## Ni掺杂对 $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$ 热电转换性能的影响

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摘要 采用熔融法合成了Skutterudite化合物 $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$ ,

并研究了Ni掺杂对该化合物的高温热电性能的影响. 实验结果表明: 由于Ni向Skutterudite结构中提供电子, 导致化合物的载流子浓度和电导率随Ni置换量的增加而增加, Seebeck系数为负值, Seebeck系数的峰值温度随Ni置换量的增加向高温方向移动; Ni置换引入了电子-声子散射, 导致晶格热导率降低. 对于Skutterudite化合物 $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$ , 得到的最大热电性能指数ZT约为0.55.

关键词 [Ni掺杂](#) [Skutterudite](#) [热电性能](#)

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## Influence of Ni Doping on the Thermoelectric Properties of $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$

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**Abstract** Skutterudite compound  $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$  was synthesized by the melting method and its thermal and electrical properties were measured in the temperature range of 300~850K. The carrier concentration and electrical conductivity increase with increasing Ni content substituting for Co. The absolute value of Seebeck coefficient decreases and  $T_{\text{opt}}$  of Seebeck coefficient shifts to a higher temperature with the increase of Ni content. These different transport behaviors in the samples are ascribed to the introduction of extra electrons to the Skutterudite structure by Ni substitution. The lattice thermal conductivity of  $\text{Co}_{4-x}\text{Ni}_x\text{Sb}_{12}$  is significantly depressed as compared to that of  $\text{CoSb}_3$  by introducing extra electron-phonon scattering mode. The maximum ZT value obtained for  $\text{Co}_{3.92}\text{Ni}_{0.08}\text{Sb}_{12}$  at 750K is about 0.55.

**Key words** [Ni doping](#) [skutterudite](#) [thermoelectric transport properties](#)

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