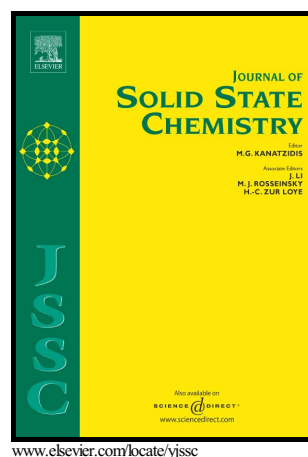


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# Enhancing thermoelectric and mechanical performances in BiCuSeO by increasing bond covalency and nanostructuring

Bo Feng<sup>a,b,c</sup>, Guangqiang Li<sup>a,b,c</sup>, Zhao Pan<sup>a,b,c</sup>, Xiaoming Hu<sup>a,b,c</sup>, Peihi Liu<sup>a,b,c</sup>, Yawei Li<sup>a,b,c</sup>, Zhu He<sup>a,b,c</sup>, Xi'an Fan<sup>a,b,c,\*</sup>

<sup>a</sup>The State Key Laboratory of Refractories and Metallurgy, Wuhan University of Science and Technology, Wuhan 430081, China

<sup>b</sup>National-Provincial Joint Engineering Research Center of High Temperature Materials and Lining Technology, Wuhan University of Science and Technology, Wuhan 430081, China

<sup>c</sup>Key Laboratory for Ferrous Metallurgy and Resources Utilization of Ministry of Education, Wuhan University of Science and Technology, Wuhan 430081, China

## Abstract

The layered oxyselenide BiCuSeO thermoelectric ceramics are attracting much scientific attention for its excellent thermoelectric properties. Herein, Bi<sub>1-x</sub>Sb<sub>x</sub>CuSe<sub>1-x</sub>Te<sub>x</sub>O ( $x=0, 0.01, 0.02, 0.04, 0.06, 0.08$ ) ceramics have been prepared by ball milling (BM) and resistance pressing sintering (RPS) process. The effects of Sb/Te doping and grain size on the thermoelectric/mechanical properties are investigated systematically. For the former, it can tune the Fermi level and promote the band convergence, decreasing the band gap and concurrently enhancing the carrier concentration; for the latter, it can profoundly modify microstructure into an all-scale hierarchical architecture to scatter phonons with broad range of mean free paths, effectively reducing the lattice thermal conductivity. The results indicates that the

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