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Thermoelectric properties of Cu2Se and densified by cold sintering process

The phonon-liquid electron-crystal becomes a fascinating concept for thermoelectric material in recent years. The Cu₂Se is a potential material for this concept. Due to it goods electrical properties of Cu₂Se, this work is successfully synthesized Cu₂Se powder using a high-energy ball milling method. The Cu₂Se disc-shaped pellets were prepared by the cold sintering process (CSP) under 624 MPa pressure at 200 ˚C for varied content of a thiol-amine solution. The sample density was measured with the geometric shape after the post-annealing at 550 ˚C. The bulk densities are greater than 70% of the theoretical density and exhibit excellent thermoelectric properties. The power factor of the CSP-Cu₂Se shows over 1000 181;W/mK² due to the high electrical conductivity and Seebeck coefficient. The highest figure of merit demonstrates about 1.27 at 800 K. In addition, the CSP allows the preparation of the outstanding Cu₂Se at low temperatures.

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