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Formation of Silver Selenide and Copper Selenide synthesized by Pack Cementation and Mechanical alloying processes

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There is a strong demand for new energy sources due to the growing population and limited natural resources. Among the different renewable energy resources, thermoelectric material plays a key role. Selenides compounds, such as Ag2Se and Cu2Se, have received a lot of attention because of their interesting properties, low toxicity, and abundance. Particurarlly, Ag, Cu, and Se are less toxic than Bi, Pb, Sb, and Te, while Se is about 10 times more abundant than Te. High-energy ball milling1,2 , (HEBM) process is a powerful solid-state synthesis/powder mechanical alloying method. Chemical Vapor Deposition by Pack Cementation (CVDPC) is an ideal synthesis procedure because it is simple, easily controllable and inexpensive . The objective of this work is to synthesize Ag2Se and Cu2Se compounds by using two different techniques: HEBM and CVDPC processes. In HEBM a series of experiments were carried out by various milling times (from 1h to 20 hrs). In CVDPC process two different deposition times (3 and 4 hours) was selected at $238C$ heating temperature.

The structural and morphological characterization of the selenides were studied by Fourier Transform Infrared Spectroscopy, X-ray Diffraction, X-ray Photoelectron Spectroscopy and Scanning Electron Microscopy. It was found that the selenides were successfully synthesized by HEBM and pack cementation process.

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References

1. W.K. Min et al., Materials Science Forum, 534-536 (2007).
2. C. Lee et al., J Appl. Phys. 101, 024920 (2007)
3. D. Stathokostopoulos et al., Results in Materials 13, 00252 (2022)

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