

CuAsTe a New Family of Thermoelectric Glasses

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Abstract:

Glasses and chalcogenide glasses especially, have a potential yet to be explored as thermoelectric materials. They already possess a low thermal conductivity and can have an high Seebeck coefficient (S). The challenge lies on making them more electrically conducting without affecting too much the previously mentioned transport properties. We have recently shown [1] that the power factor, S^2/ρ (ρ : resistivity) of the $\text{Cu}_{x+y}\text{Ge}_{20-x}\text{Te}_{80-y}$ family of glasses, is strongly improved by increasing the Cu concentration.

Here we report the studies on a new family of glasses obtained in the Cu-Te-As system and prepared by melt spinning. Our results show that the melt spinning technique allows us to extend the Cu-Te-As glassy domain and leads to T_g values, that permit the use of these glasses in applications up to 100°C. A maximum S^2/ρ value of $\sim 100 \mu\text{WK}^{-2}\text{m}^{-1}$ [2] was obtained for the $\text{Cu}_{30}\text{As}_{15}\text{Te}_{55}$ composition, a power factor twice that of the best value obtained for the Cu-Ge-Te system, confirming these chalcogenide glasses as potential candidates in the quest for new high-performance thermoelectric materials

References:

- [1] A.P. Gonçalves, E.B. Lopes, O. Rouleau and C. Godart, *Journal of Materials Chemistry* 20 (2010) 1516.
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