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Study of effects of Te addition and oxygen contamination on the surface
short range order structure of Ge-Bi-Se glass by XPS

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Abstract

The short range order structure of $\text{Bi}_{13}\text{Ge}_{20}\text{Se}_{67-x}\text{Te}_x$ glasses ($x=0, 5, 10, 15, 20$ at.%) is explored by using high-resolution X-ray photoelectron spectroscopy. Results show that the incorporated oxygen from surface containment of specimens and Te substitution for Se exert important impacts on the network structure of glasses. Oxygen breaks the Ge-Ge homopolar bonds in the Ge-Se-Bi glass, leading to a significant reduction of the over-constrained Ge-Ge \equiv (Se)₃ ethane-like units. Te addition promotes the formation of mixed $\text{BiSe}(\text{Te})_{3/2}$ nanolayers as crystal precursors, thus initiating crystallization in competition to a topological self-organization process. The present work will be helpful to deepen the understanding of ChG glasses for applications in fields of optoelectronics and photonics.

Keywords

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