

Structural properties of high-speed phase change materials

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Phase change (PC) recording is now extensively employed to high-density non-volatile memories. Since 1970s, various materials have been proposed for this purpose, and nowadays we have obtained two superior materials of $\text{GeTe-Sb}_2\text{Te}_3$ (GST) and Sb-Te based alloys such as AIST (Ag-In-Sb-Te quaternary compounds). These compounds enable very fast phase change in practical use. As you can see, these compounds were found in the Ge-Sb-Te ternary system; thereby, both the amorphous phase and the crystalline phase of these two materials have the same 3+3 (three shorter and three longer) coordination structures in common. For this structural resemblance between the two phases, slight atomic shifts enable swift structural change from one phase to the other in a very short time.