

Phase-Change Materials: Blessed with Unique Bonding and Extraordinary Properties

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Phase-change chalcogenide materials are a class of chalcogenide compounds characterized by a number of unique properties. These materials demonstrate differences in physical properties between the amorphous and crystalline phases. Unlike other chalcogenide compounds, during crystallization of phase-change chalcogenide materials, a change in chemical bonding takes place. The transition from the amorphous to the crystalline phase occurs in less than 100 ns. This set of properties of phase-change chalcogenides makes them promising for use in binary code recording, by assigning the amorphous state to the logical "0" and the crystalline state of phase-change chalcogenides to the logical "1". Currently, chalcogenide phase-change materials are used as functional materials in optical memory devices. They are promising for creating electronic non-volatile memory, which will replace the devices used today. The difference in optical properties in the visible range opens up prospects for the use of phase-change chalcogenide compounds in photonics and in the creation of non-volatile displays.