

Structural modification of chalcogenide glasses by gamma-irradiation studied with DBAL technique

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Abstract

The original experimental results on the study of structural modification of chalcogenide glasses by ^{60}Co γ -irradiation with energy of 1.25 MeV and dose of 2.41 MGy for As_2S_3 , $\text{Ge}_{15.8}\text{As}_{21}\text{S}_{63.2}$, $\text{Ge}_{9.5}\text{As}_{28.6}\text{S}_{61.9}$ and $\text{Ge}_{23.5}\text{As}_{11.8}\text{S}_{64.7}$ alloys using Doppler broadening of annihilation line (DBAL) technique are reported. The γ -irradiation-induced effect is analyzed in terms of Doppler S and W annihilation parameters. In particular, the observed different slope of S -W plots for glassy (g-) As_2S_3 and g- $\text{Ge}_{15.8}\text{As}_{21}\text{S}_{63.2}$ studied in the unirradiated and γ -irradiated states indicates that the defect structure of these alloys in the radiation-modified state is different, obviously, as a result of various mechanisms of radiation-induced defect formation. © 2012 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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Keywords

Chalcogenide glasses, Defects, Doppler broadening annihilation line, Gamma-irradiation