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Nanoindentation test of radiation-modified As₂S₃ glass after ⁶⁰Co gamma-irradiation

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Abstract

© 2016, Editorial Department of Journal of the Chinese Ceramic Society. All right reserved. The results of the surface mechanical properties (i.e., hardness and elastic modulus) in the unmodified and radiation-modified As₂S₃ glass measured about 10 years after ⁶⁰Co γ -irradiation, using a nanoindentation test with an ultra nano hardness tester (UNHT) were reported. It is indicated that the γ -irradiated g-As₂S₃ (g- for glassy) with the average energy of ⁶⁰Co γ -quanta of 1.25 MeV and the accumulated dose of 2.41 MGy exhibits the increased surface hardness and elastic modulus values, compared to the unirradiated material, in the range of 200-1 600 nm indentation depth. In the long-term radiation-induced improvement of the surface mechanical properties in g-As₂S₃, the broader distribution of the experimental data was detected for the irradiated sample with radiation-induced oxidized layer, compared to the clean sample without the layer that was removed by washing and polishing.

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Keywords

Chalcogenide glass, Mechanical properties, Nanoindentation, Radiation modification