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The temperature dependence of the time-averaged drift mobility in As2S3 glass derived from PA measurements

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Abstract

The temperature dependence of the bimolecular recombination rate coefficient (b) and the time-averaged drift mobility in As2S3 glass was studied in the range 77–330 K on the basis of steady-state photoinduced absorption (PA) measurements. PA measurements have been carried out on glass samples in the form of optical fibres. The steady-state PA coefficient varies approximately as the square root of the excitation light intensity, indicating a bimolecular mechanism for the recombination of excess carriers. In most disordered semiconductors carrier transport is diffusion-limited and taking into account that for chalcogenide glasses the electron drift mobility μn « μp the hole drift mobility, the latter was derived from μp=(εε0/e)b. The time-averaged mobility, μp, was found to be thermally activated at the higher temperatures with activation energy ~0.9 eV, and with μp~10–10 cm2/Vs at 300 K, but almost temperature independent below approximately 130 K.