

# Influence of annealing and temperature on the absorption edge of $\text{As}_2\text{S}_3$ -Ge amorphous films

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## Abstract

Results are presented of absorption edge investigations of  $\text{AsS}_{1.5}\text{Ge}_x$  amorphous films ( $0 \leq x \leq 2$ ) at temperatures of 110, 300, 370, and 420 °K. An effect of low-temperature annealing on the optical parameters of the films has been observed. The annealing causes a shift of the absorption edge to the higher energy region and an increase of the optical gap of the samples. Electron diffraction examining indicated that the films were in the amorphous state both before annealing and after it. The functional dependence of the absorption edge on photon energy has been found. In the range of the photon energy  $h\nu < E_g$  the absorption edge can be described by an exponential function and in the range of  $h\nu > E_g$  by a quadratic function of the photon energy. When the temperature varies the slope of the exponential absorption edge does not change, but the edge is shifted with temperature to the lower energy region. The values of the temperature coefficient of the absorption edge shift are  $-(4 \text{ to } 8) \times 10^{-4}$  eV/deg. The gap  $E_g$  of  $\text{AsS}_{1.5}\text{Ge}_x$  amorphous films ( $0 \leq x \leq 2$ ) determined at room temperature by optical methods lies in the range 2.4 to 1.5 eV. The shape of the absorption edge of the films under investigation and its temperature dependence are in accordance with the data obtained on glasses with a more simple chemical composition.