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## A study on photo-induced crystallization in Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> thin films

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### Abstract

This paper reports the photo-induced crystallization in glassy Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> thin films. The glassy nature of the bulk material was confirmed by non-isothermal differential scanning calorimetry measurements. The photo-induced crystallization in Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> films was done by exposing to light (using 2000 W tungsten lamp) at various illumination times under the fixed ambient temperature at 358 K. Virgin and photo-induced Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> thin films were characterized by X-rays diffraction, scanning electron microscopy, optical and electrical measurements. The photo-induced crystallization is associated to the change in structure of Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> thin films which initiated the significant change in the optical constants. The detailed examination of the optical absorption results indicated that the optical transition was indirect. The optical band gap of Ga<sub>10</sub>Se<sub>78</sub>Tl<sub>12</sub> thin films were decreased while the absorption and the extinction coefficients increased with the increase of illumination time. From dark conductivity results, the dark conductivities of thin films continuously heightened and the activation energy turned to be lower as increasing the illumination time. The lowering in optical band gap and activation energy might be due to the occurrence of photo crystallization with the increment of illumination time.

### Keywords

**KeyWords Plus:** SE-TL SYSTEM; OPTICAL-PROPERTIES; ELECTRICAL-PROPERTIES; CHALCOGENIDE GLASS; IRRADIATION; CONSTANTS; TRANSPORT; MEMORY

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