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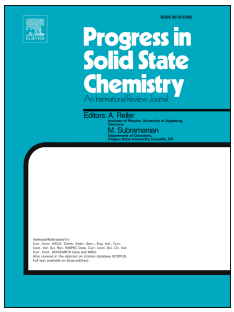

Recent developments on the optical properties of thin films of chalcogenide glasses

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Recent developments on the optical properties of thin films of chalcogenide glasses

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Abstract

Chalcogenide glasses (ChG) has emerged as important materials due to their potential applications in infrared optics for communication, imaging, limiting, remote sensing and laser power delivery *etc*. Examining ChG for their various applications, different properties of these were under immense investigation by various researchers from nearly every part of the world. Study of ChG for optical properties like optical band gap and refractive index are the backbone while considering them for applications. The present review focuses on the optical properties of various binary, ternary and quaternary chalcogenide systems. Subsequently applications and future prospects of ChG have been sketched. The attracting prospective applications have drive us to put the review on optical properties of chalcogenide thin films both comprehensive and expedient to new as well as established researchers in this area.

Keywords: Chalcogenides; Optoelectronic materials; optical band gap; refractive index; thin films.

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1. Introduction

Chalcogens are elements from group VI-A of periodic table – sulphur (*S*), selenium (*Se*) and tellurium (*Te*). A chalcogenide glass is a glass containing one or more chalcogen element as a substantial constituent. By extension, chalcogenide glasses (ChG) are named for their association between these chalcogens with electropositive materials and organic radicals. Typically any amorphous material containing an abundance of chalcogen atoms is referred to as a chalcogenide glass. ChG find applications in medical and military areas, holographic media, electrical switches, superconductivity, nonlinear elements, sensors, thermoelectric, waveguides, etc [1–8].

The ChG have reinforced large number of the products which operate with or on IR light *e.g.* IR optics for communication, imaging, remote sensing and laser power delivery [9-13]. In surgical techniques the use of fibre optics to pass high power laser light has led to substantial advances. Present optical fibres absorb light in the mid and far IR region and thus cannot be used for delivery of light in this region of wavelengths. Power up to 3 W at 10.6 μm has been carried without damaging fibres [13]. This may be sufficient for some applications. However, further research would lead to compositions with much higher power handling capabilities. Moreover, chalcogenide glasses can be used in optical switching. Traditionally this switching has been done by converting the optical signals into electrical signals and then using