光子学报 2011, **40**(9) 1307-1311 **DOI**: 10.3788/gzxb20114009.1307 **ISSN**: 1004-4213 **CN**: 61-1235/O4

论文

新型远红外Ge-Te-I硫系玻璃性能研究

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摘要:

采用传统的熔融-淬冷法制备了系列Ge20Te80－xIx(x=2,4,6,8 mol%) 玻璃样品.利用X射线衍射仪、扫描电子显微镜、差热分析仪等设备系统测试了玻璃结构和物化性质,分析了卤素I对玻璃形成及稳定性的影响|利用分光光度计、红外光谱仪等研究了玻璃光谱性质,分析了I对玻璃的短波吸收及红外透过光谱的影响|利用Tauc方程计算了样品的直接和间接光学带隙.实验结果表明:I的引入,降低了Te的金属性,提高了Te基硫系玻璃的成玻能力|随着卤素I含量的增加,玻璃的密度减小,摩尔体积增大,且短波吸收截止边发生红移,光学带隙减小|I的引入提高了玻璃的热稳定性,其中玻璃组分为Ge20Te72I8样品热稳定性最好,其特征温度（ΔT）达到121℃|各Ge-Te-I玻璃样品均具有良好的红外透过性能,其红外透过范围为1.8~25 μm.

关键词: Te基硫系玻璃 热稳定性 红外透过光谱

Novel Ge-Te-I Far-Infrared-Transmitting Chalcogenide Glasses System

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Abstract:

A novel Ge-Te-I far infrared transmitting chalcohalide glass system Ge20Te80-xIx(x=2,4,6,8mol%) was prepared by traditional melt-quenching method.Structure and physicochemical properties of Te-based glass system were studied with XRD,SEM and DTA.The effect of halogen on the glass formation and thermal stability was investigated.Optical spectra of Te-based glass system were obtained by spectrophotometer and infrared spectrometer.Effect of halogen on the short-wavelength absorption cut-off edge and infrared transmitting spectra was analyzed.The Tauc equation was used to calculate the direct and indirect optical band gap.The results show that halogen can reduce Te metallic character and improve the glass-forming ability.The density decreased while the molar volume increased with the added I2 content.With the addition of I2,the short-wavelength cut-off edge of the glasses shifts to the longer wavelength (1 700~1 900 nm),the band gap decreased.The thermal stability was enhanced by the addition of halogen.A maximum ΔT value of 121℃ was obtained for the glass composition Ge20Te72I8.These prepared Ge-Te-I glasses all have wide optical transmission window from 1.8 to 25 μm,which is a novel far infrared transmitting glass materials.

Keywords: Te-based Chalcogenide glasses Thermal stability Infrared spectroscopy

收稿日期 2011-05-25 **修回日期** 2011-07-04 **网络版发布日期** 2011-09-25

DOI: 10.3788/gzxb20114009.1307

基金项目:

国家自然科学基金(No.60878042,No.60908032,No.60978058)、宁波市自然科学基金（No.2010A610171）和浙江省杰出青年基金（No.R1101263）资助

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