

论文

Er³⁺/Ce³⁺共掺TeO₂-Bi₂O₃-TiO₂玻璃的热稳定性和光谱特性研究

王大刚¹,周亚训¹,戴世勋^{1,2},王训四¹,沈祥¹,徐铁锋¹,聂秋华¹

(1 宁波大学 信息科学与工程学院,浙江 宁波 315211)

(2 中国科学院西安光学精密机械研究所 瞬态光学与光子技术国家重点实验室,西安 710119)

摘要:

用高温熔融法制备了Er³⁺/Ce³⁺共掺新型碲酸盐玻璃(TeO₂-Bi₂O₃-TiO₂).采用差热分析方法研究了玻璃的热稳定性,测试并分析了不同Ce³⁺离子掺杂浓度下Er³⁺离子的吸收光谱、上转换光谱和荧光光谱特性.研究表明,制备的碲酸盐玻璃具有很好的热稳定性,玻璃析晶温度Tx与玻璃转变温度Tg之差(ΔT=Tx-Tg)达到了185℃,高于其它文献的报道|同时,Ce³⁺离子共掺引入的能量转移(Ce³⁺:2F5/2+Er³⁺:4I11/2→Ce³⁺:2F7/2+Er³⁺:4I13/2)有效地抑制了Er³⁺离子上转换发光并显著增强了1.53 μm波段荧光强度,而发射截面随着Ce³⁺离子掺杂浓度相应增大.优异的热稳定性以及光谱性能揭示Er³⁺/Ce³⁺共掺碲酸盐玻璃是一种潜在的制备宽带掺铒光纤放大器的理想增益介质.

关键词: 碲酸盐玻璃 热稳定性 光谱特性 Er³⁺离子 Ce³⁺离子

Thermal Stability and Spectral Properties of the Er³⁺/Ce³⁺ Co-doped TeO₂-Bi₂O₃-TiO₂Glasses

WANG Da-gang¹,ZHOU Ya-xun¹,DAI Shi-xun^{1,2},WANG Xun-si¹,SHEN Xiang¹,XU Tie-feng¹,NIE Qiu-hua¹

(1 Faculty of Information Science and Engineering,Ningbo University,Ningbo,Zhejiang 315211,China)

(2 State Key Laboratory of Transient Optics and Photonics,Xi'an Institute of Optics and Precision Mechanics,Chinese Academy of Sciences,Xi'an 710119,China)

Abstract:

Er³⁺/Ce³⁺ codoped tellurite glasses(TeO₂-Bi₂O₃-TiO₂) are prepared by conventional melt-quenching method.The thermal stability of the glass is studied by the DTA(Differential Thermal Analysis) technique,and the absorption spectra,up-conversion spectra and the fluorescence spectra of the Er³⁺ ion are measured and analyzed with the different Ce³⁺ ion doped concentration.The results show that the tellurite glass has good thermal stability,and the difference(ΔT =Tx-Tg) between the glass transition temperature Tg and the crystallization onset temperature Tx has come to 185℃,which is higher than the other reported results.The energy transfer from Er³⁺ ion to Ce³⁺ ion(Ce³⁺:2F5/2+Er³⁺:4I11/2→Ce³⁺:2F7/2 +Er³⁺:4I13/2) aroused by Ce³⁺ ion codoping can suppress the upconversion emission and improve the 1.53μm band emission intensity efficiently.And,the emission cross-section of Er³⁺ ion increases with the increasing content of Ce₂O₃.The excellent thermal stability and spectral properties indicate that Er³⁺/Ce³⁺ codoped tellurite glass is a promising gain host material for broadband erbium-doped amplifiers.

Keywords: Tellurite glasses Thermal stability Spectral properties Er³⁺ ion Ce³⁺ ion

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通讯作者: 王大刚

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