

掺Er³⁺硅酸盐玻璃上转换发光特性研究

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摘要 研究了掺Er³⁺硅酸盐玻璃的吸收光谱和上转换光谱, 应用Judd-Ofelt理论计算了Er³⁺强度参数 Ω_λ ($\lambda=2, 4, 6$)、跃迁振子强度、自发辐射几率、荧光分支比. 上转换光谱分析表明: 在522、545、658nm处有较强的绿光和红光, 分别对应于 $^2H_{11/2} \rightarrow ^4I_{15/2}$ 、 $^4S_{3/2} \rightarrow ^4I_{15/2}$ 、 $^4F_{9/2} \rightarrow ^4I_{15/2}$ 的跃迁, 发光曲线拟合斜率分别为1.67, 1.94, 1.76; 上转换发光机制主要是激发态吸收和能量转换, 且均为双光子吸收过程.

关键词 [激发态吸收](#) [能量转换](#) [上转换发光](#) [双光子吸收](#)

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Properties of Up-conversion Emission of Er³⁺-doped Silicate Glasses

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Abstract Absorption spectra and up-conversion emission spectra of Er³⁺-doped silicate glasses were investigated. The intensity parameters Ω_λ ($\lambda=2,4,6$), the oscillator strength, the spontaneous transition probabilities and the fluorescence branching ratios were calculated by the theory of Judd-Ofelt. The up-conversion emission spectra show there are stronger green light and red light centered about 522nm, 545nm and 658nm, corresponding to the transition of $^2H_{11/2} \rightarrow ^4I_{15/2}$, $^4S_{3/2} \rightarrow ^4I_{15/2}$, $^4F_{9/2} \rightarrow ^4I_{15/2}$, and the slope of fitted lines is 1.76, 1.94, 1.67, respectively, which indicates a two-photon process for the green and red light. The up-conversion mechanisms are determined to be excited state absorption and energy transfer.

Key words [excited state absorption](#) [energy transfer](#) [up-conversion emission](#) [two-photon absorption](#)

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