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材料合成及性能

温度依赖的 β -NaYF₄:Yb³⁺,Er³⁺纳米片的上转换发光

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摘要：研究了980 nm激发下 β -NaYF₄:Yb³⁺,Er³⁺ 纳米片在不同温度下的上转换发光。在不同温度下,观察到了较强的绿色和红色上转换发光,分别对应于 Er³⁺ 的(²H_{11/2}, ⁴S_{3/2}) → ⁴I_{15/2} 和⁴F_{9/2} → ⁴I_{15/2} 能级跃迁。随着温度的升高,520 nm 的绿色发光带和660 nm 的红色发光带强度逐渐增大,545 nm 的绿色发光带呈现出先增强(84~204 K)后减弱的趋势(204~483 K)。分析了样品上转换发光随温度变化的原因,并用三能级模型对样品的上转换发光随温度的变化规律进行了理论分析。

关键词：上转换 β -NaYF₄ 稀土离子 温度相关 三能级模型

Temperature-dependent Upconversion Luminescence of β -NaYF₄:Yb³⁺,Er³⁺ Nanoplates

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Abstract: Temperature dependent characteristics of upconversion luminescence in β -NaYF₄:Yb³⁺,Er³⁺ nanoplates under 980 nm excitation were reported. Intense green and red upconversion emissions corresponding to (²H_{11/2}, ⁴S_{3/2}) → ⁴I_{15/2} and ⁴F_{9/2} → ⁴I_{15/2} transitions of the Er³⁺ ions were observed, respectively. The green emission around 520 nm and the red emission around 660 nm continuously increase with increasing of temperature. The emission around 545 nm increases from 84 to 204 K and then decreases from 204 to 483 K. The temperature dependence of intensity characteristics was systematically analyzed by a simple three-level system.

Keywords: upconversion β -NaYF₄ rare earth temperature-dependent three-level system

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