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综述

基于局域表面等离子体增强的NaYF₄: Yb/Er荧光上转换及其应用

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摘要: 阐述了局域表面等离子体共振增强荧光上转换的相关机制,并以此为基础总结了三种调节机制和四种上转换/金属复合材料结构。具有明显增强效果的上转换/金属结构复合材料大致分为四种:掺入Au和Ag纳米颗粒的稀土掺杂基质;core/shell结构;稀土掺杂的NaYF₄靠近金属颗粒或金属纳米线所形成的gap结构;周期性金属阵列结构。最后介绍了它们在生物医学和光电子器件领域的应用进展。

关键词: 材料 荧光上转换 局域表面等离子体共振 金属纳米颗粒 等离子耦合发光

LSPR-enhanced upconversion luminescence of NaYF₄:Yb,Er nanoparticles and its application

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Abstract:

Localized surface plasmon resonance (LSPR) supported by metal nanoparticles or connected nanostructures was demonstrated as a powerful scheme to enhance the upconversion luminescence signals of upconversion nanoparticles (UCNPs). Three modulation mechanisms of LSPR and four types of UCNP/metallic nanostructures were introduced. The UCNP/metallic nanostructures which remarkably enhance upconversion luminescence are: Rare-earth-doped substrate doped by Ag and Au nanoparticles, core/shell structure, gap structure formed of small

distance between rare-earth-doped NaYF₄ and metal nanowires, periodic structure of metal arrays. At last, recent advances were reviewed in applications of these UCNP/metallic structures in biomedical and optoelectronic devices.

Keywords: materials upconversion luminescence localized surface plasmon resonance metal nanoparticles plasmon-coupled emission

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