发光学报
CHINESE JOURNAL OF LUMINESCENCE
中文核心期刊
主管：中国科学院
主办：中国科学院长春光学精密机械与物理研究所
中国物理学会发光分会
主编：申德振

发光学报 2013, 34(6) 792-796 ISSN: 1000-7032 CN: 22-1116/O4

发光学应用及交叉前沿

Au/Ag纳米颗粒的成像技术与应用

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摘要： 基于10 nm尺度图形加工技术,通过改变金属纳米结构的大小和形貌,利用金属纳米结构的表面等离子体共振性能开发出SEM纳米彩色图片制作技术,使得图形的像素在60 nm尺度可控(约100万dpi)。利用图像处理技术可以快速生成加工版图,而通过电子束曝光和沉积技术则能够得到结构不同的Au/Ag纳米颗粒。结果表明:由于结构不同的Au/Ag纳米颗粒的表面等离子体共振性能不同,使其发光性能覆盖了可见光波段。本文通过改变Au/Ag纳米颗粒的大小,利用图像处理算法对不同大小的Au/Ag纳米颗粒进行排列组合,从而得到SEM纳米彩色图片。

关键词： 表面等离子体共振 纳米加工 金属纳米结构 图像处理

Imaging Techniques and Applications of The Au/Ag Nanoparticles

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Abstract: Based on the 10 nm scale image processing technology and the surface plasmon resonance properties of metal nanostructures, the colorful SEM microimages can be printed by changing the size and the morphology of the metal nanostructures. As the results, the graphics pixel can be controlled in 60 nm scale (about 1 million dpi). Furthermore, using the image processing technology, the objective image can be generated faster than before and this will benefit the industrial production because of the artificial intelligent. While using the electron-beam lithography (EBL) and the deposition technology, the different structures of the Au/Ag nanoparticles can be accurately generated. And according to this paper, the results show that different structures of the Au/Ag nanoparticles can carry different surface plasmon resonance properties so that the luminescent properties of these nanoparticles can cover the visible wavelengths. In this paper, using four same size nanoparticles to represent one color can enhance the consistency between pixels. The luminescent properties of these nanoparticles will be shown by changing the size of the Au/Ag nanoparticles. And the colorful SEM microimages will also be generated while using the image processing algorithms for the permutation and combination of the different size of the Au/Ag nanoparticles.

Keywords: plasmon resonance nanofabrication metal nanostructures image processing
收稿日期 2013-03-20 修回日期 2013-04-17 网络版发布日期
基金项目:
国家自然科学基金(11274107,61204109)资助项目

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