光子学报 2008, 37(Sup2) 257-261 DOI: ISSN: 1004-4213 CN: 61-1235/O4

论文

BR-D96N薄膜全息图像存储与图像处理研究

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摘要：

基因改性细菌视紫红质BR-D96N是一种生物光致变色材料。本文利用透射式与反射式记录技术、参考光再现与共轭光再现技术及四种不同偏振记录技术（同线偏振记录、正交线偏振记录、同圆偏振记录及正交圆偏振记录），对BR-D96N薄膜进行了全息图像存储实验，并对它们的衍射效率及衍射像信噪比进行了比较。实验表明，与透射式相比反射式记录衍射效率较低，但信噪比较高；与参考光再现相比共轭光再现对物光路失调引起的波前相位畸变有补偿作用；与同偏振记录相比，正交偏振记录可滤掉散射噪声，提高再现图像的信噪比；另外，还实现了偏振复用全息记录，并证明了用偏振复用全息的方法可以实现两幅图像的相加减处理。

关键词： BR-D96N 偏振全息 偏振复用 图像相加减 BR- D96N polarization holography polarization multiplexing image subtraction and summation

Holographic Image Storage and Optical Image Processing with BR-D96N Film

Abstract:

Genetic mutant bacteriorhodopsin BR- D96N is a biological photochromic material. Here, holographic images were recorded in a BR- D96N film by using transmission-tape holographic recording and reflection-tape holographic recording technology, reference beam reconstruction and phase conjugated beam reconstruction technology, and different kind of polarization holographic recording technologies (i.e. parallel linear polarization holographic recording, orthogonal linear polarization holographic recording, parallel circular polarization holographic recording and orthogonal circular polarization holographic recording etc). The diffraction efficiencies and diffractive images' signal-to-noise-ratios (SNR) of different kinds of holograms are compared. The experimental results show that: compared with transmission-tape holographic recording, reflection-tape holographic recording hologram has lower diffraction efficiency and higher SNR; compared with reference beam reconstruction，the phase conjugated beam reconstruction can effectively correct the phase aberration caused by the mis-adjustment of optical setup; compared with parallel polarization holograms, in orthogonal polarization holograms the scattering noise can be filtered, so can get high SNR. And the polarization multiplexing holographic recording was realized, and it is demonstrated that image subtraction and summation processing can be realized by using polarization multiplexing holographic recording method.

Keywords:

收稿日期 2008-12-22 修回日期 2009-01-08 网络版发布日期 2008-12-30

DOI:

基金项目:

国家自然科学基金资助

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