原子能科学技术 2010 44 (12): 1517-1521 ISSN: 1000-6931 CN: 11-2044/TL

技术及应用

α-C_xN_y：H_{1-x-y}薄膜的制备和光学性能分析

李建根[1,2];吴卫东[1,2];马婷婷[1,2]

1.西南科技大学 理学院，四川 绵阳621010 2.中国工程物理研究院 激光聚变研究中心，四川 绵阳621900

收稿日期 修回日期 网络版发布日期:

摘要 采用外置式电容耦合低压等离子体化学气相沉积法，以高纯CH_4/N_2/H_2作为反应气体，制备非晶α-C_xN_y：H_{1-x-y}薄膜。研究了薄膜沉积速率和入射功率之间的关系，随着功率增大，薄膜沉积速率先增大后减小；SEM图像表明薄膜无层状、柱状结构；AFM图像表明薄膜粗糙度在0.2～0.3 nm之间；傅里叶红外光谱（FTIR）显示了薄膜的成键情况；紫外 可见 近红外光谱表明，随着入射功率的增大，薄膜的光学带隙逐渐减小。

关键词 外置式电容耦合低压等离子体化学气相沉积法 α-C_xN_y：H_{1-x-y}薄膜 沉积速率 形貌 光学特性

分类号

Preparation and Optical Properties of α-C_xN_y：H_{1-x-y} Films

LI Jian-gen[1,2];WU Wei-dong[1,2];MA Ting-ting[1,2]

1.School of Science, Southwest University of Science and Technology, Mianyang 621010, China;2.China Academy of Engineering Physics, P. O. Box 919-987, Mianyang 621900, China

Abstract Amorphous hydrogenated carbon nitride thin films (α-C_xN_y：H_{1-x-y}) were synthesized by external capacitive coupling low pressure plasma chemical vapor deposition (LPPCVD) with CH_4, N_2 and H_2 gases. The deposition rate and optical properties of the deposited CHN films were systematically analyzed as a function of radio power. The morphology of the films was investigated by scanning electron microscopy (SEM) and atomic force microscopy (AFM). The chemical structure and elemental composition of the CHN films were characterized by Fourier transform infrared spectroscopy (FTIR). The FTIR investigation demonstrates the presence of carbon-nitrogen bonds with hydrogenated components in the films. And its optical gap ranges from 1.953-2.359 eV, and the optical gap becomes narrower with the incident power increasing.

Key words external capacitive coupling low pressure plasma chemical vapor deposition α-C_xN_y：H_{1-x-y} films deposition rate _ morphology optical property

DOI

通讯作者