

A

CVD金刚石核探测材料与器件

@夏义本\$上海大学材料科学与工程学院!上海200072 @王林军\$上海大学材料科学与工程学院!上海200072 @张明龙\$上海大学材料科学与工程学院!上海200072 @苏青峰\$上海大学材料科学与工程学院!上海200072

收稿日期 2005-1-5 修回日期 网络版发布日期:

摘要 金刚石膜因其优异的电学、光学等性能已成为优越的辐射探测器材料,但探测器性能强烈地依赖于薄膜质量。本工作利用热丝化学气相沉积(HFCVD)法获得了(100)取向不同质量的金刚石薄膜,并制备了CVD金刚石辐射探测器。应用5.9keV⁵⁵FeX射线测试了探测器的光电流响应和脉冲高度分布。50kV/cm外电场作用下晶粒为10 μ m的CVD金刚石探测器的暗电流和光电流分别为16.3和16.8nA。光电流随辐照时间延长而增大,尔后趋于稳定。脉冲高度峰与噪声明显分离。探测器具有较高的计数效率和信噪比。

关键词 [CVD金刚石](#) [辐射探测器](#) [光电流](#) [脉冲高度分布](#)

分类号 [TL814](#) [TL816.1](#)

CVD Diamond for Nuclear Detection Materials and Device

XIA Yi-ben, WANG Li-n-jun, ZHANG Ming-long, SU Qing-feng (School of Materials Science and Engineering, Shanghai University, Shanghai 200072, China)

Abstract Diamond is a very attractive material to realize radiation detectors due to its exceptional electrical and optical properties, but the detector performances intensively depend on the film quality. In present work, (100) oriented CVD diamond films with different quality obtained by a hot-filament chemical vapor deposition (HFCVD) technique were used to fabricate radiation detectors. 5.9 keV X-ray from a ⁵⁵Fe source was used to measure the photocurrents and the pulse height distributions (PHDs) of CVD diamond detectors. For the detector with a better film quality, the dark-current of 16.3 nA and the photocurrent of 16.8 nA were obtained at an electrical field of 50 kV/cm. The time-dependent photocurrents performed in the darkness indicate that the photocurrents initially increase and then level off. The peak of the pulse-height discrimination is well separated from the noise, indicating a higher counting efficiency and a higher signal-noise ratio.

Key words [CVD diamond](#) [radiation detector](#) [photocurrent](#) [pulse height distribution](#)

DOI

通讯作者

扩展功能

本文信息

▶ [Supporting info](#)

▶ [\[PDF全文\]\(662KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“CVD金刚石”的 相关文章](#)

▶ [本文作者相关文章](#)