

工艺条件对热丝 CVD金刚石薄膜电学性能的影响

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摘要 采用不同的沉积条件, 通过HFCVD方法制备了四种不同质量、不同取向的CVD金刚石薄膜. 讨论了薄膜退火前后的介电性能. 研究了不同沉积条件和退火工艺与介电性能之间的联系. 通过扫描电镜SEM、Raman光谱、XRD、I-V特性曲线以及阻抗分析仪表征CVD金刚石薄膜的特性. 结果表明, 退火工艺减少了薄膜吸附的氢杂质, 改善了薄膜质量. 获得的高质量CVD金刚石薄膜具有好的电学性能, 在50V偏压条件下电阻率为 $1.2 \times 10^{11} \Omega \cdot \text{cm}$, 频率在2MHz条件下介电常数为5.73, 介电损耗为0.02.

关键词 [退火工艺](#) [化学气相沉积金刚石薄膜](#) [沉积条件](#)

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Effects of Process Conditions on Electric Properties of Hot-filament CVD Diamond Films

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Abstract By using different deposition conditions, four CVD diamond films with different qualities and orientation were grown by the hot-filament CVD technique. The dielectric properties of these films before and after annealing were investigated in detail. A study of the relationship between the different deposition conditions and annealing process with respect to the dielectric properties was carried out. These CVD diamond films were also characterized with SEM, Raman spectroscopy, XRD, I-V characteristics and impedance analyzer. The annealing process reduces the hydrogen contamination of the films and therefore improves the film quality. CVD diamond films with high quality and good electric properties such as a resistivity of $1.2 \times 10^8 \Omega \cdot \text{cm}$ at a bias of 50V, a dielectric constant of 5.73 and a dielectric loss of 0.02 at a frequency of 2MHz were obtained.

Key words [annealing process](#) [CVD diamond films](#) [deposition condition](#)

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