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正偏压对纳米金刚石薄膜结构和电阻率的影响

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摘要 采用电子辅助热丝化学气相沉积工艺, 在1kPa反应气压和施加不同的偏流条件下, 沉积了纳米金刚石薄膜. 用X射线衍射, 场发射扫描电镜和半导体特性表征系统对该薄膜进行了表征和分析. 结果表明, 施加偏流可以使薄膜晶粒呈现明显的(110)晶面择优取向, 表面形貌发生较大变化. 当偏流为8A时, 薄膜晶粒达到最小值, 约为20nm, 薄膜表面也最光滑. 本文讨论了在低气压和电子轰击条件下(110)晶面择优取向的形成机制及其对薄膜显微形貌和电阻率的影响关系.

关键词 纳米金刚石薄膜 择优取向 显微形貌 电阻率

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Influences of Positive Bias on Microstructure and Electrical Properties of Nanocrystalline Diamond Films

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Abstract In a system of electron assisted hot filament chemical vapor deposition, nanocrystalline diamond films were deposited at 1kPa reaction gas pressure with different bias current. The films were characterized by X-ray diffraction, field emission scanning electron microscope and semiconductor characterization system. With appliance of bias current, the films exhibit a pronounced preferential orientation of (110) planes and change of the surface morphology. When bias current is 8A, the deposited film displays finest grain and smoothest surface. Formation of preferential orientation of (110) planes and its influence on electrical properties of the films are discussed under the condition of electrons bombardment and lower reaction gas pressure.

Key words nanocrystalline diamond films preferential orientation morphology electrical properties

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