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材料物理和化学

MPCVD生长B掺杂金刚石膜的二次电子发射研究

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摘要：研究了B掺杂金刚石膜的负电子亲和势(NEA)的行为。对于 B_2H_6/CH_4 为10 mg/L和2 mg/L的样品,一次电子能量为1 keV时最大二次电子发射系数(SEE)分别达到18.3和10.9。值得注意的是,这两个样品在测试前已在大气中搁置了几个星期,并且测量前未经过任何处理。如此高的SEE表明,样品在大气中暴露后NEA效应仍得到了保留。另外,10 mg/L B_2H_6/CH_4 掺杂样品在酸溶液中处理后NEA消失,SEE较低,而在真空中加热后NEA明显恢复,SEE在1 kV时达到10.2。

关键词：B掺杂金刚石膜 负电子亲和势 二次电子发射系数 氧化处理

Secondary Electron Emission from Boron Doped Diamond Films Grown by MPCVD

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Abstract: Behavior of negative electron affinity (NEA) from B-doped diamond films is investigated. Largest secondary electron emission (SEE) yields were found to be 18.3 and 10.9 at 1 keV primary beam energy for samples doped with 10 mg/L and 2 mg/L B_2H_6/CH_4 flow rate ratios, respectively. Note that these samples were left in air for weeks before loaded into SEE system, and subject to no treatment prior to SEE measurements. The higher SEE yields indicate that the NEA effect is well retained though the samples were exposed in air for weeks. Meanwhile, oxidation treatment of the sample doped with 10 mg/L B_2H_6/CH_4 flow rate ratio in a boiled acid destroys NEA as evidenced from the lower SEE yields, whereas heating up in vacuum brings NEA back substantially, resulting in a largest yield of 10.2 at 1 keV.

Keywords: B-doped diamond films negative electron affinity secondary electron emission yield oxidation treatment

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