

研究论文

磁控溅射制备SiC薄膜的高温热稳定性

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摘要:

采用磁控溅射方法在Si基底上制备SiC薄膜, 研究了SiC薄膜经不同温度和气氛条件高温退火前后结构、成份的变化. 结果表明, 薄膜主要以非晶为主, 由Si--C键, C--C键和少量Si的氧化物杂质组成; 在真空条件下经高温退火后, 薄膜C--C键的含量减少, 而Si--C键的含量增加, 真空退火有利于SiC的形成; 在800℃空气中退火后, 薄膜表面生成一层致密的SiO₂薄层, 阻止了氧气与薄膜内部深层的接触, 有效保护了内部的SiC. 在空气条件下, SiC薄膜在800℃具有较好的热稳定性.

关键词: 无机非金属材料 磁控溅射 热稳定性 高温退火 SiC薄膜

High-temperature thermal stability research on SiC thin films by magnetron sputtering

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Abstract:

SiC thin films were grown on Si substrates by magnetron sputtering. The structural and component changes of the films, pre and post high temperature annealing at different temperature and atmosphere conditions, were studied. The results show that the films are characterized by the amorphous microstructure and mainly composed of Si-C bondings, C-C bondings as well as a small mount of oxide impurity consorted with Si; the content of the C-C bondings decreased after annealing in vacuum, meanwhile the Si-C bondings content increased, annealing in vacuum is beneficial to the formation of SiC; after annealing at 800 in air, a thin dense layer of SiO₂ formed on the surface, which prevented the oxygen from contacting with the film and effectively protected the inner SiC from oxidizing. SiC films have good thermal stability at 800 in air.

Keywords: inorganic non-metallic materials magnetron sputtering thermal stability high-temperature annealing SiC films

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