

论文

CVD金刚石薄膜及膜-基界面形态

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摘要: 采用直流等离子体流CVD法在硬质合金基体上沉积了多晶金刚石薄膜,借助XRD、Raman光谱、SEM和EPMA等对金刚石薄膜及膜-基界面的结构、形貌和成分进行了研究.结果表明,结晶度高的刻面型金刚石薄膜质量、纯度较好,膜-基界面处较致密,机械锚固作用明显,结合性能较好沉积前后基体表面形貌变化很大,存在数十微米厚的脱钴-等离子体刻蚀层,等离子体刻蚀导致脱钴表面更加凹凸不平,为金刚石形核提供了有利条件.

关键词: CVD金刚石薄膜 界面 结合性能 形态

MORPHOLOGIES AND STRUCTURES OF CHEMICAL VAPOR DEPOSITED DIAMOND FILMS AND FILM-SUBSTRATE INTERFACES

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Abstract: Polycrystalline diamond films were deposited on cemented carbide substrates using direct current plasma jet chemical vapor deposition (CVD) method. The structures, morphologies and compositions of diamond films and film-substrate interfaces have been characterized by XRD, Raman spectroscopy, SEM and EPMA. The results show that the faceted type diamond film with high crystallinity has good quality, high purity and excellent adhesion. Its film-substrate interface is dense and tortuous, and there is a significant mechanical anchoring effect between diamond film and substrate. The morphologies of substrate surfaces change greatly after deposition, there is several tens of microns in thickness cobalt-etched layer sequentially etched by plasma. The plasma etching leads to the cobalt-etched layer much rougher, which is beneficial to the diamond nucleation.

Keywords: chemical vapor deposited diamond film interface adhesion morphology

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