
The Research of Cutting Tools Superhard Films having Strong Films and Substrate Binding Energy

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Abstract

The coating technology can effectively improve the life of the cutting tool and make the tool to obtain the excellent mechanical properties, thus greatly improving the efficiency of machining. Now cutting tools coating technology has become the main factors of the cutting technology development. Due to the high hot-hardness, high oxygenation temperature, low friction coefficient, strong films and substrate binding energy and low hot conductivity etc excellent characteristics of TiAlSiN multi-composite films. So the researches of tools superhard films have important significance to promote the development of cutting technology. Using magnetron sputtering method, a series of TiAlN and TiAlSiN films were prepared with different process parameters. The mechanical properties, element composition and microstructure were detected by X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDS), nano-indentor, transmission electron microscope (TEM). The relationship between element composition, microstructure, films and substrate binding energy, hardness and processing parameters such as target material composition, PN₂/PAr, deposition temperature and bias voltage were mainly researched. And the wear resistance and cutting performance will be studied by simulating, so the theoretical study will be improved.

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