Investigation of Thermo-Chemical Polishing of CVD Diamond Film

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Abstract

ZnO/Diamond structure has attracted a lot of attentions and heavy investment recently just because diamond has the capability of producing very high surface acoustic wave (around 10,000m/s). In this present study, the microwave chemical vapor deposition (CVD) method was employed to produce diamond films on silicon single crystal. Thermo-chemical polishing experiments were then conducted on the obtained diamond films. The underlying material removal mechanisms, microstructure of the machined surface and related machining conditions were also investigated. Thermo-chemical polishing was proved to be able to remove the diamond film very effectively (4.8μm deep of diamond film was removed in 30 minutes when polishing at 550oC and 5.7m/s). The material removal rate was increased with polishing speed and pressure. Higher polishing temperature would improve the chemical reaction and result in better surface finish.

Keyword：diamond film, thermo-chemical polishing, chemical vapor deposition