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Adhesion behavior of CVD- diamond coatings on WC-Co insert deposited onto Cr- based sublayers prepared by PVD and PED methods

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Diamond-coated cutting tools are used primarily for machining non-ferrous materials such as aluminum-silicon alloys, copper alloys, fiber-reinforced polymers, green ceramics and graphite. However poor adhesion of diamond film on WC-Co tools limits its application.In this study an effect of Cr- based interlayer on adhesion behavior of CVD- diamond films deposited onto WC-6%Co cutting inserts was investigated. The Cr- based interlayers were deposited in two ways: (i) by DC magnetron sputtering using Cr- targets in an argon-nitrogen atmosphere, and (ii) pulsed electrospark deposition (PED) using Cr- based electrodes. The diamond films on WC-Co substrate with the interlayers were prepared by microwave plasma chemical vapor deposition (MPCVD). The intelayers before diamond deposition were characterized by XRD, SEM and optical profilometry. The phase purity and stress in diamond films were analysed by Raman spectroscopy. Tribological tests at room temperature were performed for specimens prepared without and with diamond films. Adhesion of diamond films were evaluated by Rockwell tests.
It was established that CVD- diamond coatings deposited on PED interlayers on WC-6%Co inserts are characterized by higher adhesion force compared to the coatings deposited on PVD interlayers.

Keywords
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