

Development of CVD-diamond-coated WC-Co tools for enhancing tool life in the machining of hard metallic alloys or ceramics

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Single layered and dual layered diamond coatings were deposited on WC-Co substrates using hot filament chemical vapor deposition (HFCVD) technique. Nanocrystalline diamond (NCD) layer was deposited over microcrystalline diamond (MCD) layer with a coating architecture of WC-Co/MCD-NCD. Structural and micro-structural characteristics of these coatings were studied using X-ray diffraction (XRD), Raman Spectroscopy and Scanning Electron Microscopy (SEM) techniques. Using dual layer diamond coatings on WC-Co tool system with good integrity and with top layer nanocrystallinity were expected to give the advantages of both NCD and MCD coatings. Also these dual layered diamond coatings were compared with single layered diamond coating for their tribological and mechanical properties. The main objective of this work is developing an economically viable cutting tool material for machining hard metallic alloys at moderate and higher cutting speeds. Figure 1 shows the flow diagram of the research work.

Raman spectrum of top-layer NCD coating has been shown in Figure 2, which shows

characteristic peaks corresponding to the coating materials.

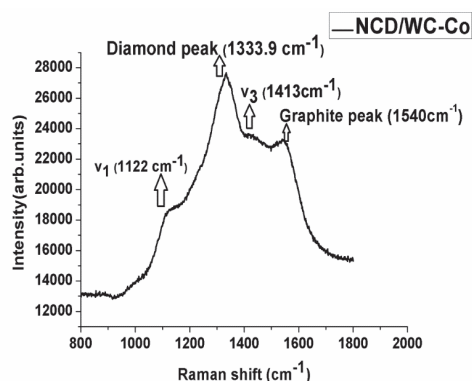


Figure 2: Raman Spectroscopy of top-layer NCD coating

References

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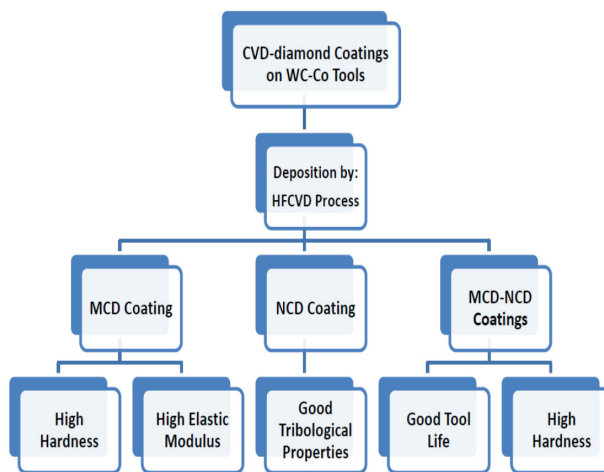


Figure 1: Flow diagram of research work