

TRIBOLOGICAL PROPERTIES OF NANOCRYSTALLINE DIAMOND COATING TESTED AT HIGH TEMPERATURE SLIDING CONDUCTIONS

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The present study deals with the tribological behavior of nanocrystalline diamond (NCD) coatings under high temperature sliding conditions. The NCD coatings were grown by plasma enhanced chemical vapor deposition (PECVD) method on hard metal (WC-Co) substrates. Wear tests were performed on ball-on-disc tribometer using a high-temperature chamber with a rotary drive at room temperature, 300, 450 and 600 °C. Si₃N₄ ball was selected as a counter body. For each condition, the experiments were repeated three times at different places on each sample. Scanning electron microscopy (SEM), optical microscopy, mechanical profilometry and Raman spectrometry were used for investigation of the morphology, size, shape and the chemical composition of the wear scars and the pristine surface. It was observed that coefficient of friction (COF) and depth and width of the wear scars increased with increasing temperature. The wear rate of NCD coatings tested at 300-450 °C was about 10 times higher than that at room temperature (Fig. 1). Strong phase transformation and oxidation of the surface was observed after the test at 600 °C.

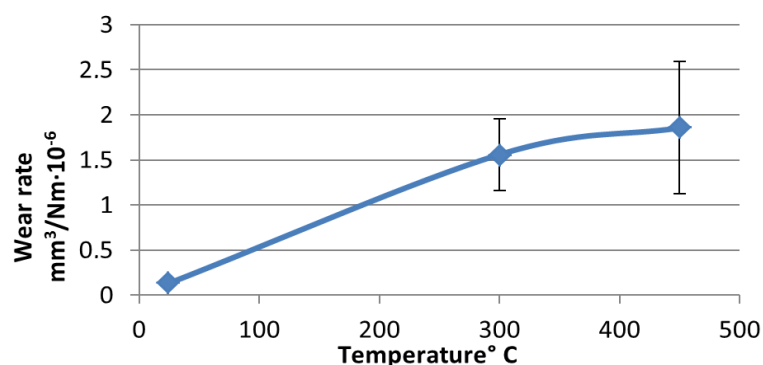


Fig. 1 Average value of wear rates versus temperature of NCD coatings



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