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PLASMA SOURCE ION IMPLANTATION OF NITROGEN AND CARBON IONS INTO CO-CEMENTED WC

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In plasma source ion implantation, the target is immersed in the plasma and repetitively biased by negative high voltage pulses to implant the extracted ions from plasma into the surface of the target material. In this way, the problems of line-of-sight implantation in ion-beam ion implantation technique can be effectively solved. In addition, the high dose rate and simplicity of the equipment enable the ion implantation a commercially affordable process.

In this work, plasma source ion implantation technique was used to improve the wear resistance of Co-cemented WC, which has been extensively used for high speed tools. Nitrogen and carbon ions were implanted using the pulse bias of -60 kV, 25 μ sec and at various implantation conditions. The implanted samples were examined using scanning Auger electron spectroscopy and XPS to investigate the depth distributions of implanted ions and to reveal the chemical state change due to the ion implantation. The implanted ions were found to have penetrated to the depth of 3000 Å. The wear resistance of the implanted samples was measured using pin-on-disc wear tester and the wear tracks were examined with alpha-step profilometer.