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SURFACE MODIFICATION OF 9Cr18 BEARING STEEL BY W+C AND Ti+C PLASMA IMMERSION ION IMPLANTATION. Zhaoming Zeng, Tao Zhang, Xiubo Tian, Baoyin Tang, Tat-Kun Kwok, and Paul K Chu, Department of Physics and Materials Science, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon, Hong Kong

9Cr18 martensitic steel (AISI 440) is commonly used as a bearing material in aerospace industry. Because of its ability to treat irregular-shaped industrial components, plasma immersion ion implantation (PIII) is an effective method to improve the wear resistance of 9Cr18 precision bearings to prolong their working lifetime. Coupled with a vacuum arc plasma source, the technique provides a good way to introduce metal and carbon ions into the bearing steel to create a special alloy and modified layer in the near surface region. In this work, W+C and Ti+C plasma immersion ion implantation is performed on 9Cr18 bearing steel using an improved vacuum arc plasma source. The surface properties of 9Cr18 steel samples are evaluated by measuring the microhardness, wear properties, and coefficient of friction. The elemental depth profiles are acquired by Auger depth profiling. Our results show that the microhardness of 9Cr18 samples are doubled after metal and carbon co-implantation. The tribological characteristics of the implanted 9Cr18 samples are also significantly improved as demonstrated by the friction and wear track width measurements. The influence of the implantation dose on the tribological properties and the modification mechanism will also be discussed.