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ABSTRACTS**

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FAST PULSING PLASMA IMMERSION ION IMPLANTATION FOR TRIBOLOGICAL APPLICATIONS. Xiubo Tian, Zhaoming Zeng, 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

Fast pulsing plasma immersion ion implantation is a new surface modification tool for metals. This technique utilizes a high pulsing frequency to accomplish a high ion flux and elevated treatment temperature, and is thus different from high voltage ion implantation and plasma nitriding. In fact, this technique combines the advantages of plasma immersion ion implantation (PIII) and plasma nitriding (PN), but is more flexible than both of them. During the fast pulsing PIII process, a lower implantation voltage is applied when compared to conventional PIII, and the plasma is generated independent of the target in contrast with PN. This novel technique is especially suitable for the treatment of samples with an irregular shape, as the plasma sheath is quite thin as a result of the low implantation voltage. In this paper, we apply the technique to various materials, such as titanium alloy, mild steel, and stainless steel. The experimental data unequivocally demonstrate a substantial increase in both the microhardness and wear-resistance after treatment at or over 400°C. Compared to the Ti6Al4V samples, SS304 and mild steels show better results, and the expanded austenite or nitrides including Fe_4N , Fe_2N , etc. form on the different sample surface.