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**ABSTRACTS**

P-01

**Process window of formation of amorphous carbon thin films  
by plasma immersion ion implantation**

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Plasma immersion ion implantation provides a new method for depositing amorphous carbon films or diamond-like-carbon films coating on steels to improve the surface properties. In this work, carbon thin films are deposited on 9Cr18 stainless bearing steel by acetylene (C<sub>2</sub>H<sub>2</sub>) plasma immersion ion implantation. The influence of the processing parameters, including RF power, implantation pulse duty cycle and implantation voltage, on the structure of the carbon films is systematically investigated. Our results suggest a processing window for the formation of DLC films. The majority of the carbon atoms exist as graphite (sp<sup>2</sup>) outside the process window. The surface properties of 9Cr18 bearing steel under different PIII conditions are evaluated by measuring the microhardness and wear. Our data reveal that the surface properties of 9Cr18 steel depend strongly on the structure of carbon film.