

Abstract Submitted
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Plasma Treatment of Metal Surface by Runaway Electrons Preionized Diffuse Discharge¹ VICTOR TARASENKO, Head of laboratory, MICHAEL EROFEEV, researcher, VASILII RIPENKO, post-doctor, MIKHAIL SHULEPOV, junior researcher, INSTITUTE OF HIGH CURRENT ELECTRONICS COLLABORATION², NATIONAL RESEARCH TOMSK POLYTECHNIC UNIVERSITY COLLABORATION³ — In this work we present experimental results on the generation of diffuse discharge initiated by runaway electron beam and X-rays in pulsed-periodic mode in nitrogen at atmospheric pressure, and its application for metal surface modification. The aim of this work is to investigate the possibilities of surface modification of copper, stainless steel, aluminum, niobium and titanium in the plasma of REP DD, formed in nitrogen flow. The study shows that REP DD treatment after exposure of 100000 shots provides ultrafine surface cleaning of all metals from carbon contamination. At the same time, it is found that all materials subjected to REP DD are involved in surface oxidation. Moreover, the surface energy of the treated specimens increased up to 4 times, whereas the other surface properties like microhardness or roughness remain almost unchanged. Thus, plasma treatment by runaway electron preionized diffuse discharge has enabled us to create an optimum metal surface without mechanical damages that is important for further coating, printing, painting, and adhesive bonding.

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