

## Accepted Manuscript

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PII: S0257-8972(18)30190-7  
DOI: doi:[10.1016/j.surfcoat.2018.02.064](https://doi.org/10.1016/j.surfcoat.2018.02.064)  
Reference: SCT 23135

To appear in: *Surface & Coatings Technology*

Received date: 16 October 2017  
Revised date: 14 February 2018  
Accepted date: 18 February 2018

Please cite this article as: N.N. Koval, A.I. Ryabchikov, D.O. Sivin, I.V. Lopatin, O.V. Krysina, Yu.H. Akhmadeev, D.Yu. Ignatov , Low-energy high-current plasma immersion implantation of nitrogen ions in plasma of non-self-sustained arc discharge with thermionic and hollow cathodes. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:[10.1016/j.surfcoat.2018.02.064](https://doi.org/10.1016/j.surfcoat.2018.02.064)

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**Low-energy high-current plasma immersion implantation of nitrogen ions in plasma of non-self-sustained arc discharge with thermionic and hollow cathodes**

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**Abstract**

This paper presents the results of low-energy high-current implantation of nitrogen ions into AISI 5140 steel. The plasma was generated using a plasma source based on non-self-sustained arc discharge, using thermionic and hollow cathodes. The influence of the temperature of the specimens and irradiation dose on the characteristics of the ion-modified layer was studied. The temperature of the specimens was controlled within the range of (450 – 650) °C by changing the duty factor of the bias pulse and the average ion current density. The microhardness of the steel after 1-hour of low-energy high-current implantation of nitrogen ions increased almost 2-fold (up to 7100 MPa), and a modified layer with a thickness up to 200 μm was formed. The wear resistance increased 7.5-fold. The main factor determining the efficiency of nitrogen dopant penetration was the temperature of the specimen. The parameters of the ion treatment influence the shape of the hardness distribution profile and the efficiency of ion cleaning of the surface.

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