

Accepted Manuscript

Effects of ion- and electron-beam treatment on surface physicochemical properties of polytetrafluoroethylene

I.V. Vasenina, K.P. Savkin, O.A. Laput, D.N. Lytkina, V.V. Botvin, A.V. Medovnik, I.A. Kurzina



PII: S0257-8972(17)31182-9
DOI: doi:[10.1016/j.surfcoat.2017.11.035](https://doi.org/10.1016/j.surfcoat.2017.11.035)
Reference: SCT 22883

To appear in: *Surface & Coatings Technology*

Received date: 28 August 2017
Revised date: 13 November 2017
Accepted date: 15 November 2017

Please cite this article as: I.V. Vasenina, K.P. Savkin, O.A. Laput, D.N. Lytkina, V.V. Botvin, A.V. Medovnik, I.A. Kurzina, Effects of ion- and electron-beam treatment on surface physicochemical properties of polytetrafluoroethylene. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Sct(2017), doi:[10.1016/j.surfcoat.2017.11.035](https://doi.org/10.1016/j.surfcoat.2017.11.035)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effects of ion- and electron-beam treatment on surface physicochemical properties of polytetrafluoroethylene

I.V. Vasenina^{a,b,*}, K.P. Savkin^b, O.A. Laput^c, D.N. Lytkina^a, V.V. Botvin^a, A.V. Medovnik^d,
I.A. Kurzina^a

^a*National Research Tomsk State University, 36 Lenin Ave, Tomsk 634050, Russia*

^b*Institute of High Current Electronics, 2/3 Akademicheskoy Ave., Tomsk 634055, Russia*

^c*National Research Tomsk Polytechnic University, 30 Lenin Ave, Tomsk 634050, Russia*

^d*Tomsk State University of Control Systems and Radioelectronics, 40 Lenin Ave., Tomsk 634050, Russia*

Abstract

The investigation of the surface physicochemical and mechanical properties of polytetrafluoroethylene (PTFE) modified by ion implantation and electron-beam treatment is described. Ion implantation was carried out at doses of 1×10^{14} , 1×10^{15} , and 1×10^{16} ion/cm² at an ion acceleration voltage of 20 kV; electron beam processing was performed with pulse durations of 100, 200, and 300 μ s, at an acceleration voltage of 8 kV. Elemental composition, wettability and surface energy, microhardness, surface resistivity, and wear-resistance were measured after beam processing. XPS-analysis reveals that both ion and electron energy deposition lead to chemical bonding of CF₃, CF and C=O, which take place due to degradation processes occurring in a surface layer. It was found that the greater the irradiation dose and pulse duration, the lower the contact angle and surface resistivity are and the greater the surface energy and microhardness are. In addition, ion implantation and electron-beam treatment result in an increase of the friction coefficient, and wear track reduction, indicating wear resistance improvement.

Key words: ion implantation, electron-beam treatment, polytetrafluoroethylene, contact angle, surface resistivity

* Corresponding author. *E-mail address:* ivpuhova@mail.ru

Download English Version:

<https://daneshyari.com/en/article/8024507>

Download Persian Version:

<https://daneshyari.com/article/8024507>

[Daneshyari.com](https://daneshyari.com)