

Proposal and Attendance Form for NSTX Research Forum 2001

First Name and Initial(s)	Oleg I.
Last Name	Buzhinsky
Email address	buzh@fly.triniti.troitsk.ru
Mailing address	<i>Troitsk, Moscow Region, 142092, Russia</i>
Phone number	(7-095) 334-05-38
Institution	<i>Troitsk Institute of Innovation and Fusion Research</i>
Co-authors	E.A. Azizov, L.B. Begrambekov, V.A. Kurnaev, V.G. Otroschenko, S.V. Vergazov, B.V. Vizgalov

Please write in the boxes below a one-page abstract of your proposal to be presented:

Title: Development of the technology of the crystalline B₄C coating in the plasma of the main tokamak discharges

Abstract:

2000 Results.

The explosive and toxic materials of deboran type or its modifications are used for boronization of the first wall in modern tokamaks [1]. The boronization is performed in glow discharge. The deposited layers are found to be not strong enough. They have amorphous structure and content big amount of hydrogen, oxygen, etc.

Recently in the PISCES-B device the new technology of boronization was developed. This technology intended for boronization of the diverter region of the DIII-D tokamak during the regular discharges [2]. The boronization was made with help of harmless and non-explosive material (carbon C₂B₁₀H₁₂). The scale machine and control system worked out in TRINITY, Russia, were used.

The He-plasma density during boronization was $8.5 \times 10^{17} \div 1.7 \times 10^{18} \text{ m}^{-3}$. Electron temperature – 29 ÷ 47 eV, temperature of the coated surface – 250 ÷ 400°C.

The deposited layer had quasi-crystalline structure. Its density, hardness, erosion parameters were close to that of the layers performed with high temperature chemical vapor deposition technology [3]. B:C relation in the deposited layer varied from 3:1 to 9:1. This relation varied from 1:1 to 2:1 in the layer deposited in the glow discharge. The deposition rate was 0.2 ÷ 1.0 μm/min in opposite to that equal to 0.01 μm/min when deposition was performed in glow discharge in DIII-D device.

2001 Research Program.

During 2001-2002 we are planning to develop the new method for application in modern tokamaks. The following investigations are planning to be performed.

1. Investigation of the mechanism of crystalline B₄C coating forming in the plasma discharge.
2. Optimization of the deposition technology, including plasma parameters, bombarding ion energy, ion current density, surface temperature, etc.
3. Investigation of the physical property of the deposited layers with help of modern methods of surface analysis, including SIMS, SEM. TDS, etc.
4. Working out technology and devices for deposition of the crystalline B₄C coating at the first wall using regular tokamak plasmas.
5. Testing of the developed technology in the conditions simulating conditions at the first

wall of tokamaks during regular discharges.
 Experiments listed in p.p. 1 and 2 will be performed in gas discharge device allowing to perform the deposition in the wide range of experimental parameters.
 Experiment of the p. 5 will be performed in the beam-driven discharge switched in the linear magnetic field.

[1] O.I. Buzhinsky, Yr.M. Semenes, Fus. Techn. Vol. 32, Aug. 1997, 1-14
 [2] O.I. Buzhinsky, D. Whyte et. al. Nucl. Mat.
 [3] O.I. Buzhinsky, Yr.M. Semenes, Fus. Engin. Des. 45, 1999, 343-360

<p>Choose only one topical session by inserting X for each proposal (Use separate forms for separate proposals)</p>	<p>2000 Results (mbell@pppl.gov) & 2001 Research Program (esynakowski@pppl.gov) (Please submit by January 10, 2001)</p> <p><input type="checkbox"/> ET1: Macroscopic Stability <input type="checkbox"/> ET2: Transport & Turbulence <input type="checkbox"/> ET3: High Harmonic Fast Wave & Electron Bernstein Wave <input type="checkbox"/> ET4: Coaxial Helicity Injection <input checked="" type="checkbox"/> ET5: Boundary Physics</p> <p>2002-2005 Research Opportunities (mpeng@pppl.gov) (Please submit by January 11, 2001)</p> <p><input type="checkbox"/> TG1: Noninductive Startup <input type="checkbox"/> TG2: Heating, Current Drive & Fueling <input type="checkbox"/> TG3: Macroscopic Stability <input type="checkbox"/> TG4: Transport & Turbulence <input type="checkbox"/> TG5: Energetic Particle Physics <input type="checkbox"/> TG6: Multiphase Interface (Boundary Physics)</p> <p>Fluctuations Measurement (esynakowski@pppl.gov) (Please submit by January 10, 2001)</p> <p><input type="checkbox"/> Fluctuations Measurement proposals</p>
--	---

Select a presentation option by inserting X:

- Oral presentation in person
- Remote presentation via ShowStation and speakerphone
- Ask discussion leader to include in discussion
- No need to present, but include in meeting summaries
- Attend Forum only (in person or with remote access)

Special Requests for your proposal (projector type, time constraints, etc.):

Please return this document via e-mail attachment to jrobinson@pppl.gov, jsavino@pppl.gov, and the corresponding organizer listed above. Please e-mail questions or comments to the organizers listed above.