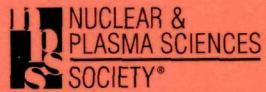


# IEEE TRANSACTIONS ON PLASMA SCIENCE

A PUBLICATION OF THE IEEE NUCLEAR AND PLASMA SCIENCES SOCIETY



AUGUST 2013

VOLUME 41

NUMBER 8

ITPSBD

(ISSN 0093-3813)

PART II OF THREE PARTS

## SPECIAL ISSUE ON VACUUM DISCHARGE PLASMAS

### GUEST EDITORIAL

Special Issue on Vacuum Discharge Plasmas .....	A. V. Batrakov	1887
---	----------------	------

### SPECIAL ISSUE PAPERS

Observation of Arc Spots Initiated on Nanostructured Tungsten .....	S. Kajita, N. Ohno, and S. Takamura	1889
Influence of Current Interruption on $V-t$ Characteristics of Vacuum Interrupters .....	T. Furukawa, M. Ueda, A. Kumada, K. Hidaka, H. Ikeda, S. Sato, S. Nishimura, H. Shimizu, T. Shioiri, and M. Homma	1896
Spectroscopy of Single Vacuum Arc Cathode Spots With Improved Sensitivity .....	R. Methling, S. A. Popov, A. V. Batrakov, D. Uhrlandt, and K.-D. Weltmann	1904
Influence of Magnetic Field on the Direction of Cathode Spot Plasma Jet Propagation .....	K. K. Zabello, S. U. Myatovich, A. A. Logatchev, and S. M. Shkol'nik	1911
Characteristics of Vacuum-Arc Cathode Spots on the Refractory Metal Electrodes .....	A. M. Chaly, Y. A. Barinov, V. S. Minaev, S. U. Myatovich, K. K. Zabello, and S. M. Shkol'nik	1917
Angular Distribution of Ions in a Vacuum Arc Plasma With Single-Element and Composite Cathodes .....	A. G. Nikolaev, G. Yu. Yushkov, K. P. Savkin, and E. M. Oks	1923
Ion Charge State Distributions of Al and Cr in Cathodic Arc Plasmas from Composite Cathodes in Vacuum, Argon, Nitrogen, and Oxygen .....	R. Franz, P. Polcik, and A. Anders	1929
Near-Cathode Plasma Layer on CuCr Contacts of Vacuum Arcs .....	N. A. Almeida, M. S. Benilov, L. G. Benilova, W. Hartmann, and N. Wenzel	1938
Space-Resolved Modeling of Stationary Spots on Copper Vacuum Arc Cathodes and on Composite CuCr Cathodes with Large Grains .....	M. S. Benilov, M. D. Cunha, W. Hartmann, S. Kosse, A. Lawall, and N. Wenzel	1950
Kinetic Modeling of Initiation of Explosion Center on Cathode Under Dense Plasma .....	D. L. Shmelev and S. A. Barengolts	1959
Modeling of Cathode Plasma Flare Expansion .....	D. L. Shmelev and S. A. Barengolts	1964
Kinetic Model of Short Vacuum Arc With Hot Evaporating Anode .....	D. L. Shmelev	1969
Kinetic Modeling of Heating of Metal Microdroplet by Surrounding Plasma .....	D. L. Shmelev and I. V. Uimanov	1974
Cathode Spot Development on a Bulk Cathode in a Vacuum Arc .....	I. I. Beilis	1979
Cu Ion Current Measurements in a Vacuum Arc With a Black Body Electrode Configuration .....	I. I. Beilis, Y. Koulik, and R. L. Boxman	1987

(Contents Continued on Page 1885)

Effective Cathode Voltage in a Vacuum Arc With a Black Body Electrode Configuration .....	I. I. Beilis, Y. Koulik, and R. L. Boxman	1992
Model of Short Vacuum Arc at Collision Free Motion of Ions .....	Y. I. Londer and K. N. Ulyanov	1996
Theory of Anode Region of Short High-Current Vacuum Arc .....	Y. I. Londer and K. N. Ulyanov	2002
Transient MHD Modeling and Simulation of High-Current Vacuum Arc Under Three Kinds of Interruption Processes .....	L. Wang, X. Huang, L. Zhang, S. Jia, L. Hu, X. Zhou, and Z. Shi	2007
Three-Dimensional Time-Dependent Model and Simulation of High-Current Vacuum Arc in Commercial Axial Magnetic Fields Vacuum Interrupters .....	L. Wang, Z. Qian, X. Huang, S. Jia, and Z. Shi	2015
Anode Temperature and Plasma Sheath Dynamics of High Current Vacuum Arc After Current Zero .....	A. V. Schneider, S. A. Popov, A. V. Batrakov, G. Sandolache, and H. Schellekens	2022
Research on the Reignition Problem and Interruption Characteristics of Series Connected Vacuum Interrupters .....	Y. Tan, H. Anji, Z. Liu, and S. Yanabu	2029
Axial Magnetic Field Strength Needed For a 126 kV Single-Break Vacuum Circuit Breaker in Test Duty T100a ....	Y. Zhang, X. Yao, Z. Liu, Y. Geng, and P. Liu	2034
Theoretical and Experimental Investigation of New Innovative TMF-AMF Contacts for High-Current Vacuum Arc Interruption .....	T. Lamara and D. Gentsch	2043
Anode Spot Formation Threshold Current Dependent on Dynamic Solid Angle in Vacuum Subjected to Axial Magnetic Fields .....	G. Kong, Z. Liu, Y. Geng, H. Ma, and X. Xue	2051
Influence of AMF on the Expansion Speed of Cathode Spots in High-Current Triggered Vacuum Arc .....	X. Song, Z. Shi, C. Liu, S. Jia, and L. Wang	2061
Removing Oxide Layers from Carbon-Steel Tubular Surfaces Using Vacuum Arcs Driven by Transverse Magnetic Field .....	Z. Shi, W. Li, N. Yan, Y. Zhang, X. Song, S. Jia, and L. Wang	2068
Investigations of Copper Chrome Coatings on Vacuum Circuit Breaker Ceramics by Electron Probe Microanalysis and Electric Field Simulation .....	I. Gramberg, M. Kurrat, and D. Gentsch	2074
Gyrotron Microwave Heating of Vacuum Arc Plasma for High-Charge-State Metal Ion Beam Generation .....	G. Y. Yushkov, A. V. Vodopyanov, A. G. Nikolaev, I. V. Izotov, K. P. Savkin, S. V. Golubev, and E. M. Oks	2081
High-Current Stages in a Low-Pressure Glow Discharge With Hollow Cathode .....	Y. D. Korolev, O. B. Frants, N. V. Landl, I. A. Shemyakin, and V. G. Geyman	2087
Mass-Energy Analysis of Ions Generated in the Anode Plasma of a High-Current Vacuum Spark .....	S. A. Popov, D. I. Proskurovsky, and A. V. Batrakov	2097
Features of the Energy Parameters and the Composition of the Ion Flow From the Plasma at the Spark Stage of Vacuum Discharge .....	Y. A. Zemskov and I. V. Uimanov	2107
Emission of Negative Ions From Surfaces With High Emissivity .....	D. N. Sinelnikov, V. A. Kurnaev, N. V. Mamedov, and A. P. Popov	2113
Measurements of Secondary Electron Emission from Dielectric Window Materials .....	B.-P. Song, W.-W. Shen, H.-B. Mu, J.-B. Deng, X.-W. Hao, and G.-J. Zhang	2117
Influence of Electrode Geometry on Pulsed Surface Flashover of the Alumina Insulator in Vacuum .....	C. Yanlin, X. Wei, and L. Ming	2123
Progress in the Validation of the Voltage Holding Prediction Model at the High-Voltage Padova Test Facility .....	A. De Lorenzi, N. Pilan, and E. Spada	2128
Optimized Multipactor-Resistant Wedge-Shaped Waveguide Bandpass Filters .....	J. H. González, D. R. García-Baquero, C. Ernst, D. Schmitt, V. E. B. Esbert, B. G. Martínez, M. T. Calduch, and C. V. Quiles	2135
Measurement of Parameters of Particle Beams Generated by High-Voltage Surface Vacuum Discharge in Coaxial and Linear Electrode Geometry .....	P. A. Morozov, I. F. Punanov, R. V. Emlin, and A. S. Gilev	2145
Parameters of Plasma Ion Flows Produced by a Short Electron Beam at a Dielectric Surface .....	I. L. Muzyukin	2150
Triggered Vacuum Switch With an Axial Magnetic Field .....	M. R. Akhmetgareev, D. F. Alferov, R. A. Bunin, D. V. Yeassin, and Vladimir A. Sidorov	2154
Analysis of Conduction Characteristics of Field-Breakdown Triggered Vacuum Switches .....	F. Gai, S. Chen, H. Jiang, W. Tian, J. Chen, and X. Li	2160
Simulation of a Moving Boundary in Plasma Electron Sources .....	V. M. Sveshnikov, O. N. Petrovich, and L. V. Vshivkova	2166
Electrostatic Plasma Lens Focusing of an Intense Electron Beam in an Electron Source With a Vacuum Arc Plasma Cathode .....	V. I. Gushenets, A. A. Goncharov, A. M. Dobrovolskiy, S. P. Dunets, I. V. Litovko, E. M. Oks, and A. S. Bugaev	2171

---

Formation of Surface Alloys With a Low-Energy High-Current Electron Beam for Improving High-Voltage Hold-Off of Copper Electrodes .....	A. B. Markov, E. V. Yakovlev, and V. I. Petrov	2177
Effective Processes for Arc-Plasma Treatment in Large Vacuum Chambers of Technological Facilities .....	D. P. Borisov, N. N. Koval, A. D. Korotaev, V. M. Kuznetsov, V. Y. Romanov, P. A. Terekhov, and E. V. Chulkov	2183
Electron Beam Cladding by HSS R6M5 Powder .....	S. F. Gnyusov, V. G. Durakov, and A. A. Ignatov	2196
Gradual Tuning of the Current Pulse Width Within 1–0.03 ns in Gas-Filled Diodes of Nanosecond Electron Accelerators .....	S. B. Alekseev, E. K. Bakht, D. V. Rybka, and V. F. Tarasenko	2201
Plasma Characteristics of Single Aluminum Wire Electrically Exploded in High Vacuum .....	J. Zhao, Q. Zhang, W. Yan, X. Liu, L. Liu, Q. Zhou, and A. Qiu	2207
Expansion Characteristics of Plasma Generated by Electrically Exploding Single Aluminum Wire in High Vacuum .	J. Zhao, Q. Zhang, W. Yan, X. Liu, L. Liu, Q. Zhou, and A. Qiu	2214
Study on Characteristics of Nanopowders Synthesized by Nanosecond Electrical Explosion of Thin Aluminum Wire in the Argon Gas .....	L. Liu, Q. Zhang, J. Zhao, W. Yan, L. Zhang, Z. Wang, and W. Tie	2221

---