

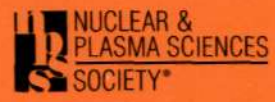
111  
I-68/4ps

u φ

# IEEE TRANSACTIONS ON

# PLASMA SCIENCE

A PUBLICATION OF THE IEEE NUCLEAR AND PLASMA SCIENCES SOCIETY



JANUARY 2013      VOLUME 41      NUMBER 1      IPTSBD      (ISSN 0093-3813)

## REGULAR PAPERS

### Basic Processes in Fully and Partially Ionized Plasmas

Electron Pressure and Transport Analysis During QSH States in RFX-mod . . . . .	<i>A. Fassina, A. Alfieri, M. Agostini, F. Auricemma, M. Brombin, P. Franz, R. Lorenzini, L. Marrelli, E. Martines, G. Spizzo, and P. Zanca</i>	2
Simulations of Breakdown Voltage of Coplanar Electrodes Microplasma Devices . . . . .	<i>L.-G. Meng, J.-P. Xing, Y.-J. Lv, Z.-H. Liang, and C.-L. Liu</i>	12
A Time-Dependent Collisional Sheath Model for Dual-Frequency Capacitively Coupled RF Plasma . . . . .	<i>M. T. Rahman, M. N. A. Dewan, A. Ahmed, and M. R. H. Chowdhury</i>	17
The Coupling of Ion-Enhanced Field Emission and the Discharge During Microscale Breakdown at Moderately High Pressures . . . . .	<i>Y. Li, R. Tirumala, P. Rumbach, and D. B. Go</i>	24
The Effects of Wave Optics as They Are Observed in Ionization Waves in Plasma . . . . .	<i>A. N. Belonogov, A. E. Dubinov, A. N. Maksimov, and V. D. Selemir</i>	36
Plasma Low-Pressure Nonsteady Diffusion Fluid Model for Pulsed Plasma Recovery . . . . .	<i>Y. Li, B. Zheng, and M. K. Lei</i>	43
Unified Numerical Simulation of Metallic Foil Electrical Explosion and Its Applications . . . . .	<i>B.-Q. Luo, C.-W. Sun, J.-H. Zhao, and J. He</i>	49
Sympathetic Current Pulses in Atmospheric Pressure Weakly Ionized Acetylene/Argon Plasma . . . . .	<i>E. C. Wemlinger and P. D. Pedrow</i>	58

### Microwave Generation and Microwave Plasma Interaction

Acceleration of an Electron Inside the Circular and Elliptical Waveguides by Microwave Radiation . . . . .	<i>A. Abdoli-Arani, B. Jazi, and B. Shokri</i>	62
Effect of Electron Emission on Microparticle Heating and Melting in High-Power Microwave Systems . . . . .	<i>Y. Han, G. S. Nusinovich, and T. M. Antonsen, Jr.</i>	70
Electrodeless Mercury-Free Microwave-Driven Indium-Iodide-Based High-Intensity Discharges with High Color Rendering Index (June 2012) . . . . .	<i>C. Kaiser, C. M. Ögün, R. Kling, and W. Heering</i>	77
400-GHz Continuous-Wave Clinotron Oscillator . . . . .	<i>S. S. Ponomarenko, S. A. Kishko, V. V. Zavertanniy, E. M. Khutoryan, I. V. Lopatin, B. P. Yefimov, and A. N. Kuleshov</i>	82
Efficient Parallelization of a Three-Dimensional High-Order Particle-in-Cell Method for the Simulation of a 170 GHz Gyrotron Resonator . . . . .	<i>J. Neudorfer, A. Stock, R. Schneider, S. Roller, and C.-D. Munz</i>	87

### Charged Particle Beams and Sources

Charged-Particle Emission and Self-Biasing of a Piezoelectric Transformer Plasma Source . . . . .	<i>B. T. Hutsel, S. D. Kovaleski, E. A. Baxter, and J. W. Kwon</i>	99
Investigation of the Piezoelectric Effect as a Means to Generate X-Rays . . . . .	<i>B. Gall, S. D. Kovaleski, J. A. VanGordon, P. Norgard, A. Benwell, B. H. Kim, J. W. Kwon, and G. E. Dale</i>	106

(Contents Continued on Page 1)



## Industrial, Commercial, and Medical Applications

Decomposition of Sodium Acetate by Pulsed Discharge in Water Droplet Spray . . . . .	T. Nose, Y. Hanaoka, Y. Yokoyama, and Y. Minamitani	112
Surface Hydrophilization of Polyimide Films Using Atmospheric Damage-Free Multigas Plasma Jet Source . . . . .	T. Takamatsu, H. Hirai, R. Sasaki, H. Miyahara, and A. Okino	119
Hydrogen Production From Partial Oxidation of Methane Using an AC Rotating Gliding Arc Reactor . . . . .	X. D. Li, H. Zhang, S. X. Yan, J. H. Yan, and C. M. Du	126
Investigation on Welding Arc Interruptions in the Presence of Magnetic Fields: Arc Length, Torch Angle and Current Pulsing Frequency Influence . . . . .	R. P. Reis, A. Scotti, J. Norrish, and D. Cuiuri	133
Dielectric Barrier Discharge Assisted Transformation of Cyclohexane to C <sub>1</sub> and C <sub>2</sub> Hydrocarbons	G. R. Dey and T. N. Das	140
Gas Flow Effect on <i>E. coli</i> and <i>B. subtilis</i> Bacteria Inactivation in Water Using a Pulsed Dielectric Barrier Discharge . . . . .	B. G. Rodríguez-Méndez, A. N. Hernández-Arias, R. López-Callejas, R. Valencia-Alvarado, A. Mercado-Cabrera, R. Peña-Eguiluz, S. R. Barocio, A. E. Muñoz-Castro, and A. de la Piedad-Beneitez	147
Low-Voltage Atmospheric-Plasma Generation by Utilizing Afterglow Initiation Carrier . . . . .	L. Lee and Y. Kim	155
Wall-Voltage Stability in AC-PDP Dielectric Barrier Discharges . . . . .	Y. Chen, Q. Li, K. Hu, W. Kuang, and H. Tolner	159

## Pulsed Power Science and Technology

Research on Reliability and Lifetime of Solid Insulation Structures in Pulsed Power Systems . . . . .	L. Zhao, J. Su, X. Zhang, Y. Pan, L. Wang, X. Sun, and R. Li	165
Design, Realization, and Experimental Test of a Coaxial Exponential Transmission Line Adaptor for a Half-Impulse Radiating Antenna . . . . .	F. Vega, F. Rachidi, N. Mora, N. Peña, and F. Roman	173
Metal Double-Puff Z-Pinch . . . . .	R. B. Baksh, A. G. Roussikh, A. S. Zhigalin, and V. I. Oreshkin	182
Analysis and Enhancing of Self-Breakdown Voltages of a Multistage Gas Switch . . . . .	P. Cong, T. Sun, A. Qiu, and Z. Zeng	187
A Simple Self-Breakdown Sharpening Switch With Low Jitter and Stable Breakdown Voltage . . . . .	Y. Liu, X. Feng, F. Lin, and L. Li	192
A Single-Switch High-Voltage Lamp Tester for Cold Cathode Fluorescent Lamps . . . . .	H.-L. Cheng, C.-S. Moo, Y.-C. Hsieh, Y.-N. Chang, and C.-L. Lu	199
Repetitive Frequency Fitch Booster Using Coupled Magnetic Switches . . . . .	H. Ren, W. Ding, J. Wu, F. Li, C. Fan, and X. Ren	207

## Arcs and MHD

Study on the Characteristics of Different Plasma Ignition Schemes . . . . .	X. Li, R. Li, S. Jia, Y. Zhang, and J. Qu	214
---	---	-----

## Space Plasmas

Plasma Impedance Probe: Simulations and Comparison to Sounding Rocket Mission Data. . . . .	S. Patra and E. A. Spencer	220
---	----------------------------	-----

## Special Issue—High Power Microwave Generation 2012

Ferrimagnetic Nonlinear Transmission Lines as High-Power Microwave Sources . . . . .	J.-W. B. Bragg, J. C. Dickens, and A. A. Neuber	232
Frequency Variation of a Reflex-Triode Virtual Cathode Oscillator . . . . .	A. Roy, A. Sharma, V. Sharma, A. Patel, and D. P. Chakravarthy	238

## Special Issue—Numerical Simulation of Plasmas

Analysis of Tunable Absolute Band Gaps in 2-D Honeycomb Lattice Plasma Photonic Crystals . . . . .	X.-K. Kong, S.-B. Liu, H.-F. Zhang, L. Zhou, Y. Fan, C.-Z. Li, and W.-Z. Xu	243
--	---	-----

## Special Issue—Pulsed Power Science and Technology 2012

Semiconductor Switches in a Counterpulse Capacitor Bank . . . . .	R. A. Serebrov, R. S. Enikeev, and B. E. Fridman	250
---	--	-----

## Special Issue—Selected Papers from SOFE 2011

Integrated Procedure for Halo Current Reconstruction in ITER . . . . .	S. Peruzzo, R. Albanese, P. Bettini, M. Caputano, N. Marconato, M. Mattei, G. Rubinacci, A. Soppelsa, and F. Villone	257
Development Overview of Solid-State Multimegawatt Regulated High-Voltage Power Supplies Utilized by NBI and RF Heating Systems . . . . .	P. Patel, C. B. Sumod, D. P. Thakkar, L. N. Gupta, V. B. Patel, L. K. Bansal, K. Qureshi, V. Vadher, N. P. Singh, and U. K. Baruah	263