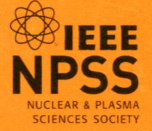


TU  
1-62/4ps

# IEEE TRANSACTIONS ON PLASMA SCIENCE



A PUBLICATION OF THE IEEE NUCLEAR AND PLASMA SCIENCES SOCIETY

OCTOBER 2014

VOLUME 42

NUMBER 10

ITPSBD

(ISSN 0093-3813)

PART I OF THREE PARTS

## 7TH TRIENNIAL SPECIAL ISSUE ON IMAGES IN PLASMA SCIENCE

### GUEST EDITORIAL

7th Triennial Special Issue on Images in Plasma Science .....	2327
..... <i>A. Agarwal, D. Shiffler, X. Lu, W. White, and M. Sankaran</i>	

### SPECIAL ISSUE PAPERS

#### Atmospheric Pressure Glows Discharges and Dielectric Barrier Discharges

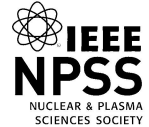
Experimental Study on the Pattern Structure of a Boundaryless, 1-D Dielectric Barrier Discharges Using a Ring Electrode .....	2328
Study on the Arc Levitation Behaviors of AC Partial Arc on a Wet Contaminated Surface .....	2330
Study on the Effects of Dielectric Barrier Discharge on the Bunsen Flame Structure With OH-PLIF Technique .....	2332
Coplanar Dielectric Barrier Discharge on a High-Permittivity Dielectric Surface .....	2334
Visualization of a Coaxial Dielectric Barrier Discharge Driven by a Sub-ns Rising High-Voltage Pulse and Its Reflections .....	2336
Production of Ammonia by Heterogeneous Catalysis in a Packed-Bed Dielectric-Barrier Discharge: Influence of Argon Addition and Voltage .....	2338
Effect of Pulse Polarity on Nanosecond Surface Dielectric Barrier Discharge .....	2340
Dynamics of Mode Transition in Air Dielectric Barrier Discharge by Controlling Pressures .....	2342
On the Influence of Anode Composition on the Pattern of a Nanosecond Diffuse Discharge at Atmospheric Pressure .....	2344
Large Conical Discharge Structure of an Air Discharge at Atmospheric Pressure in a Point-to-Plane Geometry .....	2346

(Contents Continued on Page 2317)



# IEEE TRANSACTIONS ON PLASMA SCIENCE

A PUBLICATION OF THE IEEE NUCLEAR AND PLASMA SCIENCES SOCIETY



OCTOBER 2014

VOLUME 42

NUMBER 10

ITPSBD

(ISSN 0093-3813)

PART I OF THREE PARTS

## 7TH TRIENNIAL SPECIAL ISSUE ON IMAGES IN PLASMA SCIENCE

---

### GUEST EDITORIAL

7th Triennial Special Issue on Images in Plasma Science .....	
..... A. Agarwal, D. Shiffler, X. Lu, W. White, and M. Sankaran	2327

---

### SPECIAL ISSUE PAPERS

#### **Atmospheric Pressure Glows Discharges and Dielectric Barrier Discharges**

Experimental Study on the Pattern Structure of a Boundaryless, 1-D Dielectric Barrier Discharges Using a Ring Electrode .....	S. Wang, J. Zhang, S.-Z. Li, and D. Wang	2328
Study on the Arc Levitation Behaviors of AC Partial Arc on a Wet Contaminated Surface .....	H. Yang, L. Pang, X. Yang, X. Yu, and J. Zhou	2330
Study on the Effects of Dielectric Barrier Discharge on the Bunsen Flame Structure With OH-PLIF Technique .....	H.-B. Mu, L. Yu, P. Li, M. Zhang, C.-L. Tang, J.-H. Wang, Z.-H. Huang, and G.-J. Zhang	2332
Coplanar Dielectric Barrier Discharge on a High-Permittivity Dielectric Surface .....	J. Rahel, T. Moravek, and Z. Szalay	2334
Visualization of a Coaxial Dielectric Barrier Discharge Driven by a Sub-ns Rising High-Voltage Pulse and Its Reflections .....	H. Höft, T. Huiskamp, M. Kettlitz, and A. J. M. (Guus) Pemen	2336
Production of Ammonia by Heterogeneous Catalysis in a Packed-Bed Dielectric-Barrier Discharge: Influence of Argon Addition and Voltage .....	J. Hong, S. Prawer, and A. B. Murphy	2338
Effect of Pulse Polarity on Nanosecond Surface Dielectric Barrier Discharge .....	L. Pang, K. He, and D. X. Di	2340
Dynamics of Mode Transition in Air Dielectric Barrier Discharge by Controlling Pressures .....	S. Wu, Z. Wang, Q. Huang, W. Wang, S. Yu, C. Zou, Y. Lu, and X. Lu	2342
On the Influence of Anode Composition on the Pattern of a Nanosecond Diffuse Discharge at Atmospheric Pressure .....	A. Chollet, P. Jeanney, S. Pasquiers, P. Tardiveau, and P. Désesquelles	2344
Large Conical Discharge Structure of an Air Discharge at Atmospheric Pressure in a Point-to-Plane Geometry .....	F. Pechereau, P. L. Delliou, J. Jánský, P. Tardiveau, S. Pasquiers, and A. Bourdon	2346

---

(Contents Continued on Page 2317)



---

Atmospheric Pressure RF Discharge in Neon and Helium .....	2348
..... R. Josepson, Z. Navrátil, L. Dosoudilová, P. Dvovrák, and D. Trunec	
Schlieren Imaging of Shock-Wave Formation Induced by Ultrafast Heating of a Nanosecond Repetitively Pulsed Discharge in Air .....	2350
..... D. A. Xu, D. A. Lacoste, and C. O. Laux	
Influence of Ambient-Air Nitrogen on the Argon Plasma Generated by a TIAGO Torch Open to Atmosphere .....	2352
..... R. Rincón, J. Muñoz, and M. D. Calzada	
Comparison of $\mu$ s- and ns-Pulse Gliding Discharges in Air Flow .....	2354
..... C. Zhang, T. Shao, H. Ma, C. Ren, P. Yan, and Y. Zhou	
Large-Scale Nonthermal Plasma Generated by Repetitive Nanosecond Pulses and Barrier-Free Wire Electrodes in Atmospheric Pressure Air .....	2356
..... Y.-L. Liu, L. Li, B. Yu, Y.-F. Ge, Y. Le, H. Wen, M. Ning, and F.-C. Lin	
Propagation of a Dielectric Barrier Discharge in a Multichannel Mixing Chip Microreactor .....	2358
..... S. Stauss, C. Ishii, K. Kuribara, K. Urabe, and K. Terashima	
Glow-Like Helium and Filament-Like Argon Plasma Jets of Using a Dielectric Barrier Configuration at Atmospheric Pressure .....	2360
..... Q. Li, H. Takana, Y.-K. Pu, and H. Nishiyama	
Rotating Concentric Spot-Ring Pattern in a Dielectric Barrier Discharge System .....	2362
..... J. Yang, L. Dong, P. Zhu, C. Zhang, and X. Zhang	
Flexible Dielectric Barrier Discharge Reactor With Water and Teflon Dielectric Layers .....	2364
..... H.-W. Park, I. J. Cho, S. Choi, and D.-W. Park	
Organization of Dielectric Barrier Discharges in the Presence of Structurally Inhomogeneous Wood Substrates .....	2366
..... O. Levasseur, A. Bouarouri, N. Naudé, R. Clergereaux, N. Gherardi, and L. Stafford	
Inducing a Dielectric Barrier Discharge Plasma Within a Package .....	2368
..... P. J. Cullen, N. N. Misra, L. Han, P. Bourke, K. Keener, C. O'Donnell, T. Moiseev, J. P. Mosnier, and V. Milosavljević	
Characteristics of a Dielectric Barrier Discharge Reactor With Two L-Shaped Electrodes Working in Helium .....	2370
..... M. Hur, W. S. Kang, and Y. H. Song	
Development of a Single Filament Pulsed Dielectric Barrier Discharge in Volume and on Surface .....	2372
..... H. Höft, M. Kettlitz, T. Hoder, R. Brandenburg, and K.-D. Weltmann	
Striated Structure of Constricted Discharges in Coplanar Dielectric Barrier Discharge in Neon .....	2374
..... X. Zhao and J. Ouyang	
Ion Distribution Functions in Electrically Asymmetric Capacitively Coupled Radio-Frequency Discharges in Hydrogen .....	2376
..... S. Mohr, E. Schüngel, J. Schulze, and U. Czarnetzki	
Coaxial Diffuse Discharges Driven by Repetitive Nanosecond Pulses at Different Air Pressures .....	2378
..... C. Zhang, T. Shao, Z. Zhou, W. Yang, V. F. Tarasenko, and P. Yan	
Arc Contact Ablation: High Speed Camera Visualization .....	2380
..... M. Masquère, K. Hernandez, P. Freton, J.-J. Gonzalez, and M. Razafnimanana	
Study on Dynamic Characteristic in Force Interrupted DC Vacuum Arc .....	2382
..... L. Bin, W. Jianwen, and X. Chao	
Power Dependence of the Pink Afterglow in Flowing Postdischarge in Pure Nitrogen .....	2384
..... F. Krčma, V. Mazánková, I. Soural, and V. Guerra	
A Nonthermal Plasma Cage Using Repetitive Nanosecond Pulse Source in the Open Air .....	2386
..... Y. Teng, L. Li, L.-Q. Jiang, W. Hu, L. Liu, and M.-H. Liu	
The Glow in a Three-Body Recombination Dominated Afterglow .....	2388
..... T. V. Tsankov, S. Siepa, P. S. Böhm, D. Luggenhölscher, and U. Czarnetzki	
Inductive Discharge Driving by Oblique Field Penetration Into the Plasma .....	2390
..... A. P. Demerdzhiev, K. T. Tarnev, S. S. Lishev, D. Y. Yordanov, and A. P. Shivarova	

### **Atmospheric Pressure Streamers, Sparks, and Corona Discharges**

Propagation of a Positive Streamer Toward a Dielectric Tip in Pure Nitrogen and in Air Under Voltage Pulses With Sub-ns Rise Time .....	2392
..... A. Dubinova, J. Teunissen, and U. Ebert	
Surface Streamer-to-Leader Transition Under Positive Impulse Voltage .....	2394
..... J. Deng, Y. Li, Y. Xu, Z. Lin, A. Kumada, and K. Hidaka	
Electron Avalanche Assisted by Preionization of Electron Beam in Ar .....	2396
..... X. Pei, Z. Wang, Q. Huang, K. Chen, S. Wu, Y. Xian, and X. Lu	
Highly Temporal Visualization of Generation Process of Underwater Secondary Streamer From Developed Primary Streamer .....	2398
..... H. Fujita, S. Kanazawa, K. Ohtani, A. Komiya, T. Kaneko, and T. Sato	
Stroboscopic Images of Streamers Through Air and Over Dielectric Surfaces .....	2400
..... D. J. M. Trienekens, S. Nijdam, and U. Ebert	

Deflection of Streamer Path in DC Electric Potential .....	<i>A. Shashurin, D. Scott, M. N. Shneider, and M. Keidar</i>	2402
Streamer Inception and Propagation in a Multiple Wire-Cylinder Pulsed Corona Reactor .....	<i>F. J. C. M. Beckers, A. J. M. Pemen, and E. J. M. Heesch</i>	2404
Simulated Streak Pictures for the Production of Chemical Species in an Atmospheric Pressure Streamer Discharge .....	<i>A. Komuro and R. Ono</i>	2406
Diffuse Discharges in Open Air Sustained by Microsecond and Nanosecond Pulses .....	<i>T. Shao, C. Zhang, Y. Zhou, Q. Xie, Z. Zhou, and P. Yan</i>	2408
Glow Modes in Radio Frequency Atmospheric Discharge Operating With and Without Anodized Electrodes .....	<i>S. Hussain, H. I. A. Qazi, A. A. Malik, and M. A. Badar</i>	2410
Stabilization of a Methane–Air Swirl Flame by Rotating Nanosecond Spark Discharges .....	<i>J. P. Moeck, D. A. Lacoste, D. Durox, T. F. Guiberti, T. Schuller, and C. O. Laux</i>	2412
Visualization of a Spark Discharge Driven by a High-Voltage Pulse With Sub-ns Rise-Time at Atmospheric Pressure .....	<i>T. Huiskamp, H. Höft, M. Kettlitz, and A. J. M. Pemen</i>	2414
3-D Particle Modeling of Positive Streamer Inception from a Needle Electrode in Supercritical Nitrogen .....	<i>A. Sun, J. Teunissen, and U. Ebert</i>	2416
Formation of Nonbranched Positive Streamer With High-Frequency Impulse Voltage in Atmospheric Air .....	<i>T. Matsumoto, K. Kijima, Y. Izawa, and K. Nishijima</i>	2418
A Full 3-D Dynamically Adaptive Unstructured Grid Finite-Volume Approach to Simulate Multiple Branching in Streamer Propagation .....	<i>F. Benkhaldoun, J. Fovrt, K. Hassouni, J. Karel, G. Scarella, and D. Trdlivcka</i>	2420
<b>Atmospheric Pressure Plasma Jets, Bullets, and Flows</b>		
Dual Plasma Bullets Colliding Inside a Hollow Electrode of a Multielectrode Helium Plasma Jet .....	<i>X. Wang, D. Li, S. Wang, D. Liu, C. Li, and M. G. Kong</i>	2422
Microwave Plasma Jets Excited With Low Power .....	<i>P. Liu, M. Chen, J. Chen, Z. Zheng, F. Guo, and M. Liu</i>	2424
Importance of Plasma Thermal Energy Transfer for Plasma Jet Systems .....	<i>D. P. Dowling, M. Donegan, P. J. Cullen, V. J. Law, and V. Milosavljevic</i>	2426
On the Bullet-Streamer Dualism .....	<i>S. Reuter, A. Schmidt-Bleker, S. Iseni, J. Winter, and K.-D. Weltmann</i>	2428
Influence of Atmospheric Pressure Guided Streamers (Plasma Bullets) on the Working Gas Pattern in Air .....	<i>P. Svarnas, P. K. Papadopoulos, P. Vafeas, A. Gkelios, F. Clément, and A. Mavon</i>	2430
Multichannel Discharging Characteristics of a Plasma-Jet Triggered Gas Switch .....	<i>W. Tie, X. Liu, and S. Liu</i>	2432
Electrode Plasma Jets in Powerful Pulsed Discharge in High-Pressure Gas .....	<i>M. E. Pinchuk, A. A. Bogomaz, A. V. Budin, and P. G. Rutberg</i>	2434
Evidence of the Influence of Plasma Jets on a Helium Flow Into Open Air .....	<i>M. Foletto, V. Puech, J. Fontane, L. Joly, and L. C. Pitchford</i>	2436
Investigation on Atmospheric Pressure Plasma Jet Array in Ar .....	<i>C. Qian, Z. Fang, J. Yang, and M. Kang</i>	2438
Atmospheric Pressure Plasma Jet Array With Multivariate Cells .....	<i>Z.-S. Chang, G.-J. Zhang, C.-W. Yao, W.-L. Liao, and X.-M. Shi</i>	2440
Dynamic Evolution of Helium Atmospheric Pressure Plasma Jet With ITO-PET Electrodes .....	<i>Z.-S. Chang and G.-J. Zhang</i>	2442
Influence of Oxygen Impurity on the Atmospheric Pressure Helium Plasma Jet Behavior .....	<i>W. Ning, L. Wang, S. Jia, C. Wu, and M. Fu</i>	2444
Spatio-Temporally Resolved Mapping of Helium Metastable Density in an Atmospheric Pressure Plasma Jet .....	<i>G. Cadot, C. Douat, V. Puech, and N. Sadeghi</i>	2446
Study on Plasma Jets Generated With Different Working Gases and Propagating in Different Surrounding Gases ....	<i>Y. Xian, P. Zhang, X. Pei, and X. Lu</i>	2448
Supersonic Plasma Jets of Different Gases in Low-Pressure Environment .....	<i>W. Pan, X. Meng, H. Huang, and C. Wu</i>	2450
Diffusion and Filamentary Regime of an Atmospheric Pressure DC Plasma Jet in Nitrogen and Air .....	<i>X. Deng, A. Y. Nikiforov, and C. Leys</i>	2452
High-Speed Visualization of Filament Instabilities and Self-Organization Effect in RF Argon Plasma Jet at Atmospheric Pressure .....	<i>J. Schäfer, J. Šperka, G. Gött, L. Zajíčková, and R. Foest</i>	2454
Study of Cold Ar Atmospheric Pressure Plasma Jet Generated With the Tapered Quartz Tube .....	<i>Z. Hao and S. Ji</i>	2456
Flow and Discharge Development in an Argon Atmospheric Pressure Plasma Jet Observed by ICCD and PLIF Imaging .....	<i>S. Iseni, S. Reuter, A. Schmidt-Bleker, and K.-D. Weltmann</i>	2458

---

A Novel Room-Temperature Air Plasma Jet Array Driven by DC Power Supply .....	2460
..... P. Zhang, S. Wu, X. Tan, Y. Tu, X. K. Pei, J. Gou, K. Zhou, and Y. Yang	
Phase-Resolved Spectroscopy Synchronized to Low-Frequency Self-Organized Mode of an Atmospheric Pressure Plasma Jet .....	2462
..... S. Peters, M. Andrasch, J. Schäfer, R. Foest, S. Reuter, and K.-D. Weltmann	
Effective Control of the Arc Discharge-Generated Plasma Jet by Smartly Designed Magnetic Fields .....	2464
..... O. Baranov, J. Fang, M. Keidar, X. Lu, U. Cvelbar, and K. Ostrikov	
Peculiar Relationship of Plume Brightness and Hard Layer Formation in Atmospheric-Pressure Plasma Jet Nitriding .....	2466
..... R. Ichiki, T. Inoue, Y. Yoshimitsu, H. Yamamoto, S. Kanda, M. Yoshida, S. Akamine, and S. Kanazawa	
Images of SCABER Cells Treated by a Low Temperature Plasma Jet .....	2468
..... M. Laroussi, L. V. Way, S. Mohades, and N. Berekzi	
An Atmospheric Cold Plasma Jet With a Good Uniformity, Robust Stability, and High Intensity Over a Large Area .....	2470
..... H.-P. Li, Q.-Y. Nie, A. Yang, Z.-B. Wang, and C.-Y. Bao	
Modulation-Induced Filament Tearing in Microwave Atmospheric Plasma Jet .....	2472
..... J. Hnilica, L. Potočňáková, and V. Kudrle	
Plasma Jet-to-Jet Coupling Behavior Between Two Plasma Jet Arrays for Surface Treatments Requiring Strong Discharge Process .....	2474
..... J. Y. Kim, J. H. Kim, H.-J. Kim, D. W. Moon, and H.-S. Tae	
Electrode-Embedded Atmospheric Pressure Plasma Jet Device for Humid Environment .....	2476
..... J. Y. Kim, J. H. Kim, H.-S. Tae, and D. W. Moon	
Intense Ar Plasma Array Jet With Ring-Type Focusing Electrode .....	2478
..... J. H. Kim, H.-J. Kim, J. Y. Kim, and H.-S. Tae	
Influence of the Nozzle Material on an Atmospheric Pressure Nitrogen Plasma Jet .....	2480
..... S. Léoment, D. B. Salem, O. Carton, J. Pulpytel, and F. Arefi-Khonsari	
Visualization of the Distribution of Oxidizing Substances in an Atmospheric Pressure Plasma Jet .....	2482
..... T. Kawasaki, K. Kawano, H. Mizoguchi, Y. Yano, K. Yamashita, M. Sakai, T. Shimizu, G. Uchida, K. Koga, and M. Shiratani	
OH Radicals Distribution in a Nanosecond Pulsed Atmospheric Pressure Plasma Jet .....	2484
..... C. Zou and X. Pei	
Flame and Trident Plasma Emissions of Single Rectangular-Shaped Atmospheric Pressure Plasma Jet .....	2486
..... C.-S. Park, D. Y. Kim, Y.-S. Ko, H.-B. Gu, H.-S. Tae, and S.-O. Kim	
Generation of Large Volume Atmospheric Pressure Air Plasma .....	2488
..... A.-A. H. Mohamed, A. A. Al-Mashraqi, S. M. Shariff, M. Benganem, A. H. Basher, and S. A. Ouf	
Reactive Oxygen Species Controllable Nonthermal Atmospheric Pressure Plasmas Using Coaxial Geometry for Biomedical Applications .....	2490
..... C.-S. Park, D. Y. Kim, and S.-O. Kim	
Impact of Wire Electrode Length on Nanosecond-Pulse Diffuse Discharge in Atmospheric Pressure Air .....	2492
..... Y. Bin, L. Li, Y.-L. Liu, Y.-F. Ge, L. Liu, N. Ma, Y. Le, and F.-C. Lin	
Behavior of Atmospheric Pressure Plasma Jet in External Electric Field .....	2494
..... L. Liu, Y. Zhang, and J. Ouyang	
Nanosecond Imaging of Shock- and Jet-Like Features .....	2496
..... E. R. Tubman, R. Crowston, R. Alraddadi, H. W. Doyle, J. Meinecke, J. E. Cross, R. Bolis, D. Lamb, P. Tzeferacos, D. Doria, B. Reville, H. Ahmed, M. Borghesi, G. Gregori, and N. C. Woolsey	
Modeling of Striated Filaments Occurring in a Nonthermal RF Plasma Jet at Atmospheric Pressure .....	2498
..... F. Sigeneger and D. Loffhagen	
High-Velocity Neutral Plasma Jet Formed by Dense Plasma Deflagration .....	2500
..... K. T. K. Loebner, B. C. Wang, F. R. Poehlmann, Y. Watanabe, and M. A. Cappelli	
Multi-SWD Plasma Jet System for PECVD Deposition of Thin Films .....	2502
..... J. Olejníček, M. Čada, J. Šmíd, Š. Kment, and Z. Hubička	
Unexpected Plasma Plume Shapes Produced by a Microsecond Plasma Gun Discharge .....	2504
..... T. Darny, E. Robert, D. Riès, S. Dozias, and J.-M. Pouvesle	
Helical Plasma Propagation of Microsecond Plasma Gun Discharges .....	2506
..... T. Darny, E. Robert, S. Dozias, and J.-M. Pouvesle	
<b>High Energy Density Plasmas</b>	
Quantum Modeling of Electronic Charge Density in Warm Dense Matter .....	2508
..... G. Miloshevsky and A. Hassanein	
Computed Multiple Tomography for Translated Field Reversed Configuration Plasma .....	2510
..... S. Yoshimura, S. Sugimoto, and S. Okada	
Self-Organized Rotating Filament Structure in Plasma in the Large Helical Device After Tracer Encapsulated Solid Pellet Injection .....	2512
..... M. Shoji, N. Tamura, S. Sudo, and LHD Experiment Group	
Modeling the Single-Helical Axis State in the Reversed-Field Pinch .....	2514
..... G. R. Dennis, S. R. Hudson, and M. J. Hole	

---

---

Plasma Screening Effects on Atomic Collisional Orientation in Quantum Plasmas .....	<i>W.-P. Hong and Y.-D. Jung</i>	2516
Dense Plasmas in Magnetic Traps: Generation of Focused Ion Beams With Controlled Ion-to-Neutral Flux Ratios ....	<i>O. Baranov, X. Zhong, J. Fang, S. Kumar, S. Xu, U. Cvelbar D. Mariotti, and K. Ostrikov</i>	2518
Discharge Mode in Electrical Explosion of Aluminum Wire Under Various Argon Pressures .....	<i>J. Zhao, W. Yan, and Y. Li</i>	2520
Measuring the Evolution of Mass Density Distribution of Wire Explosion .....	<i>X. Zhu, X. Zou, S. Zhao, H. Shi, R. Zhang, H. Luo, and X. Wang</i>	2522
Mitigation of Instabilities in a Z-Pinch Plasma by a Preembedded Axial Magnetic Field .....	<i>D. Mikitchuk, C. Stollberg, R. Doron, E. Kroupp, Y. Maron, H. R. Strauss, A. L. Velikovich, and J. L. Giuliani</i>	2524
Shock-Fitting Versus Shock-Capturing Modeling of Strong Shocks in Nonequilibrium Plasmas .....	<i>R. Pepe, A. Bonfiglioli, A. D'Angola, G. Colonna, and R. Paciorri</i>	2526
<b>Magnetically Enhanced Plasmas and Wave Plasma Interactions</b>		
Plasma Instability Modeling With Mixed Wave/Diffusion Field Behavior ....	<i>A. Wilson, R. Thompson, and T. Moeller</i>	2528
Plasma Modeling With Mixed Wave and Diffusion Field Behavior .....	<i>A. Wilson, R. Thompson, and T. Moeller</i>	2530
E and H Modes of Inductively Coupled SO <sub>2</sub> Plasma .....	<i>R. Zaplotnik</i>	2532
Analysis of Magnetic Fields in Inertial Alfvén Wave Collisions .....	<i>D. J. Drake, J. W. R. Schroeder, B. C. Shanken, G. G. Howes, F. Skiff, C. A. Kletzing, T. A. Carter, and S. Dorfman</i>	2534
The Influence of L-Shaped Structure on Partial Discharge Radiated Electromagnetic Wave Propagation in GIS .....	<i>X. Wang, T. Li, D. Ding, and M. Rong</i>	2536
Influence of Dipole Magnetic Field on Circular Striations .....	<i>A. E. Dubinov, A. N. Maksimov, and V. D. Selemir</i>	2538
Effect of Substrate Bias on Production and Transport of Etchant Ions in a Magnetic Neutral Loop Discharge Plasma .....	<i>Y. Asami and H. Sugawara</i>	2540
Images of Impurity Line Emission in the Extreme Ultraviolet Region From the Large Helical Device With an Edge Stochastic Magnetic Field Layer .....	<i>S. Morita, E. Wang, C. Dong, T. Oishi, M. Goto, and X. Huang</i>	2542
Radiation Profiles Measured With Imaging Bolometers on LHD During Plasma Detachment and Their Comparison With Synthetic Images .....	<i>S. N. Pandya, B. J. Peterson, K. Mukai, M. Kobayashi, and R. Sano</i>	2544
Coherent Structures of Plasma Density in a Simply Magnetized Torus .....	<i>L. Fattorini, R. Barni, S. Caldirola, and C. Riccardi</i>	2546
Gas Discharge in Longitudinal and Transverse Magnetic Field ....	<i>A. V. Erofeev, T. A. Lapushkina, and S. A. Poniaev</i>	2548
Structure and Energy Deposition Process of an Inductively Coupled Plasma Under Confronting Divergent Magnetic Fields .....	<i>Y. Minami, Y. Asami, and H. Sugawara</i>	2550
Visualization of Magnetic Field Penetration in Multicomponent Plasma .....	<i>A. S. Richardson, J. R. Angus, S. B. Swanekamp, P. F. Ottinger, and J. W. Schumer</i>	2552
Localized Intermittent Electron Flux in an ECR Plasma .....	<i>S. Yoshimura, K. Terasaka, E. Tanaka, M. Aramaki, and M. Y. Tanaka</i>	2554
Visible Imaging of Global MHD on MAST .....	<i>D. A. Ryan</i>	2556
<b>Low Pressure Glow Discharges</b>		
Gas Heating and Transition to Obstructed Mode in DC Glow Microdischarge in Air .....	<i>E. Demidov, S. Eliseev, E. A. Bogdanov, and A. Kudryavtsev</i>	2558
Spatial Distribution of Parameters in Normal Micro-DC Glow Discharge in Air .....	<i>S. Eliseev, E. Demidov, E. A. Bogdanov, and A. Kudryavtsev</i>	2560
Effect of Nanosecond Glow Discharges on a Lean Premixed V-Flame .....	<i>D. A. Lacoste and J. P. Moeck</i>	2562
Imaging of the Asymmetric DC Discharge: Visualization to Adjust Plasma in the Novel PECVD Reactor .....	<i>G. Primc, I. Levchenko, S. Kumar, U. Cvelbar, M. Mozetic, and K. Ostrikov</i>	2564
Glow Characterization of Octafluorocyclobutane RF Plasmas .....	<i>C. Huang, Y.-R. Wang, W.-C. Ma, and C.-Y. Tsai</i>	2566
Optical and Glow Diagnostics of 13.56-MHz RF Plasma-PVDF Membrane Surface Interactions .....	<i>C. Huang, C.-Y. Tsai, W.-C. Ma, and K.-Y. Lai</i>	2568
Anhydrous Oxidation of Multiwall Carbon Nanotubes in Argon–Water Direct Current Glow Discharges .....	<i>L. Vandsburger, J.-L. Meunier, and S. Coulombe</i>	2570
Lighthouse Plasma Instability in a Capacitive RF Discharge .....	<i>T. Wegner, C. Küllig, and J. Meichsner</i>	2572

---

**Breakdown and Ionization Waves**

Distortion of the Electric Field Near Insulator Surface Observed With Electro-Optical Technique Measuring Kerr Effect ..... *W. Liu, Y. Fu, X. Zou, P. Wang, and X. Wang* 2574

Evolution From Cathode-Initiated to Anode-Initiated Flashover in Vacuum ..... *G.-Q. Su, Y. Lang, J.-Y. Zhan, B.-P. Song, G.-J. Zhang, F. Li, and M. Wang* 2576

Drifting Ionization Zone in DC Magnetron Sputtering Discharges at Very Low Currents ..... *A. Anders, P. Ni, and J. Andersson* 2578

**Non-Neutral Plasmas, Beams, and Laser Produced Channels**

Experimental Study of Electric Field Screening of Four Carbon Fiber Cathodes in a Linear Array Configuration .... *W. Tang, K. Golby, M. LaCour, and T. Knowles* 2580

Cathode Surface Morphology Effects on Field Emission: Vacuum Breakdown Creation of Field Emitters ..... *K. Almaksour, M. J. Kirkpatrick, E. Odic, P. Dessante, and P. Teste* 2582

Race Track Formation in a Magnetically Enhanced Hollow Cathode Electron Source ..... *L. Dorf, M.-F. Wu, S. Rauf, K. Collins, G. Monroy, and S. Belostotskiy* 2584

Investigations of Plasma Dynamics Within and After Laser Pulse Using Optical Streak Camera ..... *J. Wu, W. Wei, Z. Yang, and X. Li* 2586

Time-Resolved Optical Spectra of the Laser-Induced Indium Plasma Detected Using a Streak Camera ..... *M. S. Rabasovic, B. P. Marinkovic, and D. Sevic* 2588

Optical Multichannel Imaging of Pulsed Laser Deposition of ZnO ..... *J. G. Jones, L. Sun, N. R. Murphy, and R. Jakubiak* 2590

Imaging of Explosive Emission Cathode and Anode Plasma in a Vacuum-Sealed Vircator High-Power Microwave Source at 250 A/cm<sup>2</sup> ..... *J. M. Parson, J. J. Mankowski, J. C. Dickens, and A. A. Neuber* 2592

Fidelity of a Time-Resolved Imaging Diagnostic for Electron Beam Profiles ..... *D. Frayer, C. A. Ekdahl, and D. Johnson* 2594

Magnetic Stopping of Transient Laser Plasmas ..... *N. McKenna, N. Shah, S. S. Harilal, and A. Hassanein* 2596

Spatial and Temporal Characteristics of Laser Ablation Combined With Fast Pulse Discharge ..... *M. Vinić and M. Ivković* 2598

Laser-Irradiated Gas Puff Target Plasma Modeling ..... *P. Vrba and M. Vrbova* 2600

Unusual Cathode Erosion Patterns Observed for Steered Arc Sources ..... *J. Kolbeck and A. Anders* 2602

Spherical Glow Discharge at Positive and Negative Potential on the Central Electrode ..... *S. Z. Sakhapov and S. A. Novopashin* 2604

Images of a Plasma Focus Current Sheath With a Continuous Cylindrical Outer Electrode ..... *M. M. Milanese, O. D. Cortázar, M. O. Barbaglia, and R. L. Moroso* 2606

Images of Hollow Cathode Discharge Including Self-Pulsing Mode ..... *S. He and J. Ha* 2608

**Electric Discharges In and On Liquids**

Visualization of Electrolytic Reactions at a Plasma-Liquid Interface ..... *P. Rumbach, N. Griggs, R. M. Sankaran, and D. B. Go* 2610

The Arc Behavior in a Novel Kind of GaInSn Liquid Metal Current Limiting Device ..... *H. He, C. Niu, Y. Li, and H. Chen* 2612

Time Evolution of a High-Voltage Discharge in Water With Shock Wave Assistance in a Pin to Pin Geometry ..... *V. Stelmashuk* 2614

Microdischarge Ignition in Liquid Heptane ..... *A. Hamdan, I. Marinov, A. Rousseau, and T. Belmonte* 2616

The Influences of Water and Oxygen Contents on Length of Atmospheric Pressure Plasma Jets in Ar/H<sub>2</sub>O and Ar/O<sub>2</sub> Mixtures ..... *Z. Fang, Y. Zhou, and Z. Yao* 2618

Temporal Evolution of the Glow and Spark Regimes of Nanosecond Repetitively Pulsed Discharges in Water Vapor ..... *F. P. Sainct, D. A. Lacoste, and C. O. Laux* 2620

Induced Liquid Phase Flow by RF Ar Cold Atmospheric Pressure Plasma Jet ..... *J. F. M. van Rens, J. T. Schoof, F. C. Ummelen, D. C. van Vugt, P. J. Bruggeman, and E. M. van Veldhuizen* 2622

Initial Phase of a Large Atmospheric Plasmoid Generated Above a Water Surface ..... *U. Fantz, S. Briefi, R. Friedl, M. Kammerloher, J. Kolbinger, and A. Oswald* 2624

Time Evolution of a High-Voltage Discharge in Water With Shock Wave Assistance in a Plate-to-Plate Geometry .... *V. Stelmashuk* 2626

---

Degradation of Organic Compounds Using a 2-D Capillary Discharge Array in Water .....	2628
..... <i>Q.-Y. Nie, H. I. A. Qazi, H.-P. Li, J.-Y. Chen, and C.-Y. Bao</i>	
Anomalous Behavior of Cavitation Bubbles Observed in Pulsed Laser Ablation of Ni in Liquid CO <sub>2</sub> Near the Critical Point .....	2630
..... <i>S. Himeno, T. Kato, K. Urabe, S. Stauss, S. Kato, H. Muneoka, M. Baba, C. T. Suemoto, and K. Terashima</i>	
Quasi-Laminar Flow Characteristics in Hybrid-Stabilized Argon–Water Arc Discharge for Subsonic-Supersonic Regimes .....	2632
..... <i>J. Jeništa, H. Takana, H. Nishiyama, P. Křenek, M. Bartlová, and V. Aubrecht</i>	
Low-Power Pulsed Plasma Discharge in a Water Film Reactor .....	2634
..... <i>R. J. Wandell and B. R. Locke</i>	
Plasma Production in Isolated Bubbles .....	2636
..... <i>S. N. Gucker, B. S. Sommers, and J. E. Foster</i>	
Visualizing the Radiation of the Kelvin–Helmholtz Instability .....	2638
..... <i>A. Huebl, D. Pugmire, F. Schmitt, R. Pausch, and M. Bussmann</i>	

### Microplasmas

Emission Characteristics of Surface Microdischarge in Atmospheric-Pressure He/N <sub>2</sub> .....	2640
..... <i>D. Li, D. Liu, Q. Nie, D. Xu, Q. Li, and M. G. Kong</i>	
The Evolution of the Optical Emission Pattern of a Nanosecond Pulsed Helium Microdischarge With a Pin-to-Pin Electrode at Atmospheric Pressure .....	2642
..... <i>B.-D. Huang, K. Takashima, X.-M. Zhu, and Y.-K. Pu</i>	
Voids of Brightness in Nanosecond Sliding Microdischarges in Narrow Slot .....	2644
..... <i>V. V. Shatalova and A. E. Dubinov</i>	
Circular Emission and Destruction Patterns on a Silicon-Based Microdischarge Array .....	2646
..... <i>J. Golda, M. Kulsreshath, H. Boettner, V. Felix, R. Dussart, and V. Schulz-von der Gathen</i>	
HD-Image of Nanosecond Microspark .....	2648
..... <i>A. E. Dubinov, N. A. Pylayev, S. A. Sadovoy, and E. A. Sadchikov</i>	
Striations in High-Pressure Hydrogen Microplasma .....	2650
..... <i>W. Pollard, P. Suzuki, and D. Staack</i>	
Micrometer-Resolution High Speed Imaging of Pulsed Microdischarge Ignition .....	2652
..... <i>J. C. Stephens, A. S. Fierro, J. C. Dickens, and A. A. Neuber</i>	
Studies on DBD in Oxygen. Dynamics of the Gas Cooling in Microdischarge Channel .....	2654
..... <i>S. Jodzis and J. Petryk</i>	

### Space and Reentry Plasmas, and Plasmas in Nature

Ultrahigh Speed Images of Hall Thruster Azimuthal Instabilities .....	2656
..... <i>D. Liu, R. E. Huffman, R. D. Branam, and W. A. Hargus, Jr.</i>	
Interaction of Air Plasma With Ablating Heat Shield Material ....	2658
..... <i>M. E. MacDonald, C. M. Jacobs, and C. O. Laux</i>	
Modeling of a Plasma Layer in Vicinity of a Hypersonic Vehicle Using Cathodic Arc .....	2660
..... <i>A. Shashurin, T. Zhuang, M. Kundrapu, J. Loverich, I. I. Beilis, and M. Keidar</i>	
Aurora in a Bottle .....	2662
..... <i>M. Laroussi and M. A. Akman</i>	
Transient Upper Atmospheric Plasmas: Sprites and Halos .....	2664
..... <i>M. Passas, J. S. del Río, A. Luque, and F. J. Gordillo-Vázquez</i>	
Interferometric Characterization of Laboratory Plasma Astrophysical Jets Produced by a 1- $\mu$ s Pulsed Power Driver .....	2666
..... <i>D. Plouhinec, F. Zucchini, A. Luyen, D. Sol, P. Combes, J. Grunenwald, and D. A. Hammer</i>	
Visual Evidence of Magnetic Shielding With the PPS-Flex Hall Thruster .....	2668
..... <i>S. Mazouffre, J. Vaudolon, G. Largeau, C. Hénaux, A. Rossi, and D. Harribey</i>	

### Dusty, Complex, and Strongly Coupled Plasmas

Unstable Plasmoids in Dusty Plasma Experiments .....	2670
..... <i>M. Mikikian, H. Tawidian, and T. Lecas</i>	
Dust Hour Glass in a Capacitive RF Discharge .....	2672
..... <i>S. Iwashita, E. Schüngel, J. Schulze, P. Hartmann, Z. Donkó, G. Uchida, K. Koga, M. Shiratani, and U. Czarnetzki</i>	
Particle Movement in a Dusty RF Plasma at Power Switch-OFF .....	2674
..... <i>J.-F. Lagrange, I. Géraud-Grenier, F. Faubert, and V. Massereau-Guilbaud</i>	
Wave Crest Reconstruction of a Dust Density Wave Using Single Particle Trajectories .....	2676
..... <i>M. Himpel, C. Killer, T. Bockwoldt, K. O. Menzel, A. Piel, and A. Melzer</i>	
Study of the Projectile Motion in a Dust Crystal Under Microgravity Conditions .....	2678
..... <i>D. I. Zhukhovitskii, V. E. Fortov, V. I. Molotkov, A. M. Lipaev, V. N. Naumkin, H. M. Thomas, A. V. Ivlev, and G. E. Morfill</i>	
Oscillation Amplitudes in 3-D Dust Density Waves in Dusty Plasmas Under Microgravity Conditions .....	2680
..... <i>C. Killer, M. Himpel, A. Melzer, T. Bockwoldt, K. O. Menzel, and A. Piel</i>	
Recrystallization in Finite 3-D Dust Clouds .....	2682
..... <i>A. Schella, M. Mulsow, and A. Melzer</i>	
Self-Oscillating Mode of Dusty Plasma and Particles Separation .....	2684
..... <i>D. N. Polyakov, V. V. Shumova, and L. M. Vasilyak</i>	
Simulation of Three-Dimensional Dusty Plasmas .....	2686
..... <i>B. Liu and J. Goree</i>	



Imaging of the Dust Acoustic Wave to Explore Synchronization .....	<i>W. D. S. Ruhunusiri and J. Goree</i>	2688
Flow of Dusty Plasma Around an Obstacle .....	<i>J. K. Meyer, R. L. Merlino, J. R. Heinrich, and S.-H. Kim</i>	2690
<b>Laser, Beam, and Plasma Surface Interactions</b>		
Plasma Generation by Laser Filamentation in Air .....	<i>A. Schmitt-Sody, A. Lucero, B. Kamer, and D. French</i>	2692
Effect of Excimer Laser Beam Spot Size on Carbon Laser-Produced Plasma Dynamics .....	<i>P.-E. Nica, G. B. Rusu, O.-G. Dragos, and C. Ursu</i>	2694
Relative Residual Charge Distribution and the Corresponding Discharge Image of a Surface DBD .....	<i>E. Paniel, H. Rabat, and D. Hong</i>	2696
Spectrally Resolved Imaging of Ultrashort Laser Produced Plasma .....	<i>K. K. Anoop, X. Ni, X. Wang, R. Bruzzese, and S. Amoruso</i>	2698
<b>Arcs and Thermal Plasmas</b>		
Operation Patterns and Spectrum Characteristics of DC and AC Rotating Gliding Arc Plasma .....	<i>Y. Ren, X. Li, A. Wu, S. Lu, and J. Yan</i>	2700
Generation Process and Electric Arc Motion Characteristics of DC Vortex Gliding Arc Plasma .....	<i>Y. Ren, X. Li, S. Lu, and J. Yan</i>	2702
Dynamic Evolution of 50-Hz Rotating Gliding Arc Discharge in a Vortex Air Flow .....	<i>T.-L. Zhao, J.-L. Liu, X.-S. Li, J.-B. Liu, Y.-H. Song, Y. Xu, and A.-M. Zhu</i>	2704
Investigation on the Arc Phenomenon of Air DC Circuit Breaker ....	<i>H. Sun, M. Rong, Z. Chen, C. Hou, and Y. Sun</i>	2706
3-D Simulation of Plasma's Rotation Behavior in High Current Vacuum Arcs Under Realistic Spatial Magnetic Field Profile .....	<i>Z. Qian, L. Wang, S. Jia, H. Wang, X. Huang, and Z. Shi</i>	2708
Simulation of Arcing Process in High-Voltage Self-Blast Circuit Breaker Considering Motion of Valves .....	<i>Q. Wang, X. Li, and X. Jiang</i>	2710
Numerical Study of the Arc Behavior in an Air DC Circuit Breaker Considering Turbulence .....	<i>Z. Ren, M. Wu, F. Yang, Z. Yang, and J. Zhang</i>	2712
MHD Modeling of Fault Arc in a Closed Container .....	<i>M. Li, Y. Wu, Y. Wu, Y. Liu, and Y. Hu</i>	2714
Numerical Investigation on Arc Behavior in Low-Voltage Arc Chamber Considering Turbulence Effect .....	<i>M. Rong, R. Ma, J. Chen, C. Hou, and Y. Sun</i>	2716
Generation and Developing Process of Low Voltage Series DC Arc .....	<i>L. Zhu, S. Ji, and Y. Liu</i>	2718
Suppression of Instabilities in Thermal Plasma Jet by Additional Arc Current Modulation .....	<i>J. Hlína, J. Gruber, and J. Šonský</i>	2720
Plasma Characteristics of DC Hydrogen–Nitrogen Mixed Gas Arc Under High Pressure .....	<i>X. Chao, W. Jianwen, L. Bin, and L. Peng</i>	2722
Gliding Arc in Noble Gases Under Normal and Hypergravity Conditions .....	<i>L. Potočnáková, J. Šperka, P. Zikán, J. J. W. A. van Loon, J. Beckers, and V. Kudrle</i>	2724
Flow Structure Near Downstream Electrode of a Gas-Blast Circuit Breaker .....	<i>Q. Zhang, J. Liu, and J. D. Yan</i>	2726
<b>Plasma Thrusters, MHD, Flowing Plasmas, and Plasma Acceleration</b>		
Plume Characteristics of an Electrothermal Plasma Microthruster .....	<i>A. Greig, C. Charles, and R. Boswell</i>	2728
Modeling Study on the Plasma Flow and Heat Transfer Characteristics of Low-Power Hydrogen, Helium, Nitrogen, and Argon Arc-Heated Thrusters .....	<i>J.-Y. Geng, H.-X. Wang, and W.-P. Sun</i>	2730
Spatial Mode Structure of Magnetohydrodynamic Instabilities Observed by a Tangentially Viewing Soft X-Ray Camera in LHD .....	<i>S. Ohdachi, T. F. Ming, K. Watanabe, K. Toi, and LHD Experiment Group</i>	2732
Multidimensional Visualization of MHD and Turbulence in Fusion Plasmas .....	<i>C. M. Muscatello, C. W. Domier, X. Hu, N. C. Luhmann, Jr., X. Ren, P. Riemenschneider, A. Spear, L. Yu, and B. Tobias</i>	2734
<b>Plasmas in Biology and Medicine</b>		
Decomposition of Pharmaceuticals by Pulsed Corona Discharges in Water Depending on Streamer Length .....	<i>R. Banaschik, F. Koch, J. F. Kolb, and K.-D. Weltmann</i>	2736
Fibroblast Cell Morphology Altered by Low-Temperature Atmospheric Pressure Plasma .....	<i>N. Barezzi and M. Laroussi</i>	2738
Low Temperature Plasma Causes Double-Strand Break DNA Damage in Primary Epithelial Cells Cultured From a Human Prostate Tumor .....	<i>A. M. Hirst, F. M. Frame, N. J. Maitland, and D. O'Connell</i>	2740

---

Temporal Evolution of the Discharge in U.S. Medical Innovations Electrosurgical System SS-200E/Argon-2 .....	2742
..... <i>D. Scott, A. Shashurin, J. Canady, and M. Keidar</i>	
High-Speed Multi-Imaging of Repetitive Unipolar Nanosecond-Pulsed DBDs .....	2744
..... <i>M. Boselli, V. Colombo, E. Ghedini, M. Gherardi, R. Laurita A. Liguori, P. Sanibondi, and A. Stancampiano</i>	
iCCD Imaging of the Transition From Uncoupled to Coupled Mode in a Plasma Source for Biomedical and Materials Treatment Applications .....	2746
..... <i>S. Bianconi, F. Cavrini, V. Colombo, M. Gherardi, R. Laurita, A. Liguori, P. Sanibondi, and A. Stancampiano</i>	
High-Speed and Schlieren Imaging of a Low Power Inductively Coupled Plasma Source for Potential Biomedical Applications .....	2748
..... <i>M. Boselli, F. Cavrini, V. Colombo, E. Ghedini, M. Gherardi, R. Laurita, A. Liguori, P. Sanibondi, and A. Stancampiano</i>	
Solid Hazardous Waste Treatment and Material Modification by Vortex Gliding Arc Plasma .....	2750
..... <i>Y. Ren, X. Li, S. Lu, and J. Yan</i>	
Effect of Gas Flow Rate on Distribution of Active Species and Dynamics of an Atmospheric RF- (Bio) Plasma Jet .....	2752
..... <i>L. Li, C. Leys, N. Britun, R. Snyders, and A. Y. Nikiforov</i>	
Optimization Design of Atmospheric Pressure Plasma Generator for Sterilization of Endoscope .....	2754
..... <i>X. Wang, S. Wang, D. Liu, D. Li, C. Li, and M. G. Kong</i>	
DC Operated Air Plasma Jet for Antimicrobial Copper Coatings on Temperature Labile Surfaces .....	2756
..... <i>J. Kredl, S. Drache, A. Quade, M. Polak, S. Müller, S. Peglow, R. Hippler, and J. F. Kolb</i>	
Raw Food Sterilization of Flexible Dielectric Barrier Discharge Device Using Biocompatible Tubing .....	2758
..... <i>D. Y. Kim, C.-S. Park, J.-Y. Leem, and S.-O. Kim</i>	
Modeling of Low Temperature Plasma for Surface and Airborne Decontamination .....	2760
..... <i>D. Mihailova, J. van Dijk, G. Hagelaar, P. Belenguer, and P. Guillot</i>	

### **Tokamaks**

Spatially Modulated Emission of ECR Plasmas in Helium .....	2762
..... <i>A. Durocher-Jean, L. Stafford, M. Rojo, S. Dap, K. Makasheva and R. Clergereaux</i>	
Magnetic Field Line Stickiness in Tokamaks .....	2764
..... <i>C. G. L. Martins, M. Roberto, and I. L. Caldas</i>	

### **RF and Microwave Plasmas**

Enhanced Plasma Uniformity in RF Plasma With Side Multihole .....	2766
..... <i>H.-C. Lee and C.-W. Chung</i>	
Longer Microwave Plasma Jet With Different Discharge Performances Originated by Plasma-Surface Interactions ....	2768
..... <i>G. Xia, Z. Chen, A. I. Saifutdinov, S. Eliseev, Y. Hu, and A. A. Kudryavtsev</i>	
Hydrogen and By-Products Formation After the Decomposition of Ethanol by Means of a Microwave Plasma Torch at Atmospheric Pressure .....	2770
..... <i>R. Rincón, J. Muñoz, A. Marinas, and M. D. Calzada</i>	
The Evolution of the Optical Emission Pattern From a Pulsed Microwave-Excited Microstrip Split-Ring Resonator Microplasma .....	2772
..... <i>B.-D. Huang, X.-M. Zhu, W.-C. Chen, and Y.-K. Pu</i>	
Study of the Spatiotemporal Evolution of Microwave Plasma in Argon .....	2774
..... <i>M. Baeva, M. Andrasch, J. Ehlbeck, K.-D. Weltmann, and D. Loffhagen</i>	
Role of Discharge Tube in Determination of Operating Mode in Waveguide-Based Atmospheric-Pressure Microwave-Induced Plasma .....	2776
..... <i>S.-Z. Li, X. Zhang, C.-J. Chen, J. Zhang, Y.-X. Wang, and G.-Q. Xia</i>	
Optical Diagnostics of Iron Oxide Nanoparticle Synthesis in Microwave Oxygen Plasma .....	2778
..... <i>M. Šnířer, P. Zelina, and V. Kudrle</i>	
Complex Electron Heating in Capacitive Multi-Frequency Plasmas .....	2780
..... <i>J. Schulze, E. Schüngel, A. Derzsi, I. Korolov, T. Mussenbrock, and Z. Donkó</i>	
Exothermic Surface Reactions on Sintered Graphite Upon Exposure to CO <sub>2</sub> .....	2782
..... <i>A. Vesel and M. Balat-Pichelin</i>	
Observation of Stationary Plasma Striation and Collimated Plasma Transport in a 100-kHz Inductively Coupled Plasma Discharge .....	2784
..... <i>K. Takahashi and A. Ando</i>	
Spatial Distribution of a High-Power Impulse Magnetron Sputtering Glow Plasma by a Controlled Unbalanced Magnetic Field .....	2786
..... <i>T. Konishi, K. Takaki, and K. Yukimura</i>	
Ozone-Free Portable Microwave Atmospheric Air Plasma Jet .....	2788
..... <i>I. H. Won, S. K. Kang, J.-Y. Sim, and J. K. Lee</i>	

### **Plasma Processing and Fabrication**

Sputter Deposition of Nanostructured TiO <sub>2</sub> Thin Films .....	2790
..... <i>M. Horáková, P. Černý, P. Kříž, P. Bartoš, and P. Špatenka</i>	
Fabrication of SnS Using PECVD Method With Combined Solid Sources .....	2792
..... <i>J. Chen, P. Liu, M. Chen, S. Wang, G. Wang, and M. Liu</i>	

---

Synthesis of Amorphous Silicon Films With High Growth Rate by Gas-Jet Electron Beam Plasma Chemical Vapor Deposition Method .....	<i>E. A. Baranov, S. Y. Khmel, and A. O. Zamchiy</i>	2794
DC and Microwave Plasmas for Synthesis of Vertically Oriented Graphene .....	<i>Z. Bo, Y. Tian, K. Yu, H. Yang, D. Hu, J. Chen, J. Yan, and K. Cen</i>	2796
Formation of a Double Layer in Electronegative O <sub>2</sub> Plasma .....	<i>S. Sharma, C. Linnane, D. Gahan, S. Daniels, and M. B. Hopkins</i>	2798
Warm Plasma Reactor With Vortex Effect Enhanced Used for CH <sub>4</sub> -CO <sub>2</sub> Reforming .....	<i>J. Pacheco, G. Soria, R. Valdivia, M. Pacheco, F. Ramos, H. Frías M. Durán, M. Hidalgo, J. Salazar, J. Silva, and M. Ibañez</i>	2800
Energy Transferred From a Hot Nickel Target During Magnetron Sputtering .....	<i>A. Caillard, M. El'Mokh, N. Semmar, R. Dussart T. Lecas, and A.-L. Thomann</i>	2802
Surface Discharge-Assisted Injector for Partial Reforming of Liquefied Petroleum Gas to Reduce Engine Emissions .....	<i>D. H. Lee, Y. H. Park, K.-T. Kim, and C. Kim</i>	2804
Binary C-Ag Plasma Breakdown and Structural Characterization of the Deposited Thin Films by Thermionic Vacuum Arc Method .....	<i>A. Mandes, R. Vladioiu, V. Dinca, and G. Prodan</i>	2806
Plasma and Weld Pool Characteristics in a TIG Configuration .....	<i>J. Mougenot, J.-J. Gonzalez, P. Freton, M. Stadler, and M. Masquère</i>	2808
Various Shapes of Plasma Spokes Observed in HiPIMS .....	<i>A. Hecimovic, A. von Keudell, V. Schulz-von der Gathen, and J. Winter</i>	2810
Fast Time Resolved Techniques as Key to the Understanding of Energy and Particle Transport in HPPMS-Plasmas .....	<i>C. Maszl, W. Breilmann, L. Berscheid, J. Benedikt, and A. von Keudell</i>	2812
Characteristics of OH* Generation in Pin-to-Electrolyte Discharges .....	<i>S.-Y. Yoon, S.-J. Kim, Y. K. Hong, S.-H. Lee, and G.-H. Kim</i>	2814
Adding of Nitrogen in Helium DBD: Consequences on the Self-Organization of the Discharge .....	<i>A. Belinger, N. Naudé, and N. Gherardi</i>	2816
Influence of the High-Power Impulse Magnetron Sputtering Voltage on the Time-Resolved Platinum Ions Energy Distributions .....	<i>S. Cuynet, A. Caillard, T. Lecas, S. Dozias, P. Lefauchaux, G. Coudrat, A.-L. Thomann, J. Bigarré, P. Buvat, and P. Brault</i>	2818
Airflow Control by DBD Actuator Over an MDA Airfoil .....	<i>J. Li, L. Yang, B. Wang, J. Cai, and G. Wang</i>	2820
Instabilities in Capacitively Coupled Plasmas Driven by Asymmetric Trapezoidal Voltage Pulses .....	<i>P. Diomede, D. J. Economou, and V. M. Donnelly</i>	2822
<b>Pseudosparks</b>		
Characteristics of Plasma Based on Electron Beams Produced in Pseudospark Discharge Under Nanosecond Pulsed Voltages .....	<i>J. Zhang and J. Zhao</i>	2824
Visualization of a Pseudospark-Sourced Electron Beam .....	<i>D. Bowes, H. Yin, W. He, K. Ronald, A. D. R. Phelps, D. Chen, P. Zhang, X. Chen, D. Li, and A. W. Cross</i>	2826
<b>Miscellaneous Images in Plasma Physics</b>		
H <sup>-</sup> Negative Ion Production From a 2D Network of ECR Dipolar Plasma Sources .....	<i>S. Aleiferis, P. Svarnas, I. Tsiroidis, S. Béchu, M. Bacal, and A. Lacoste</i>	2828
Excitation Patterns and Heating Mechanisms During E-H-Mode Transition in Inductively Coupled RF Oxygen Discharges .....	<i>T. Wegner, C. Küllig, and J. Meichsner</i>	2830
Fully Self-Consistent 3-D Modeling of Inductively Coupled Plasmas .....	<i>A. Agarwal, J. A. Kenney, S. Rauf, and K. Collins</i>	2832
Phase Resolved Imaging of a Repetitive Extrusion of Hydrogen Plasma From a Hollow Cathode Source .....	<i>S. Dixon, J. Dedrick, C. Charles, T. Gans, D. O'Connell, and R. Boswell</i>	2834
The Beenakker's Cavity for Uniform Column of Nonequilibrium Argon Plasma Generation: Experiment and 3-D Modeling .....	<i>A. V. Tatarinov, M. Cvejić, I. L. Epstein, S. Jovičević, N. Konjević, and Y. A. Lebedev</i>	2836
Evolution of Argon Discharges in Bottle-Shaped Tube Excited by Surface Plasmon Polaritons With a Low Power Operation .....	<i>M. Chen, J. Chen, P. Liu, Z. Zheng, and M. Liu</i>	2838
Ultraviolet Images of 50-Hz AC Discharges in SF <sub>6</sub> Atmosphere .....	<i>W. Yuanyuan, J. Shengchang, L. Jinyu, Z. Lipeng, C. Yanjie, and W. Wei</i>	2840
Transition Between Patterned and Diffuse Discharge in an Ne DBD .....	<i>H. Luo, J. Ran, and X. Wang</i>	2842
Increased Flame Reactivity of a Lean Premixed Flame Through the Use of a Custom-Built High-Voltage Pulsed Plasma Source .....	<i>M. D. G. Evans, P. Versailles, F. P. Sainct, J. Berghorson, and S. Coulombe</i>	2844

---

---

Current Density Distributions on the Cathode Plates of Inductive Voltage Cells .....	<i>H. Wei, F. Sun, J. Yin, and A. Qiu</i>	2846
Multiple Fireballs in a Reactive H <sub>2</sub> /CH <sub>4</sub> Plasma .....	<i>J. Reynvaan, J. Gruenwald, M. Mayer, and P. Knoll</i>	2848
Effect of Catalyst Type on Optical Emission .....	<i>Y. Teramoto, H.-H. Kim, A. Ogata, and N. Negishi</i>	2850
Identification of Coherent Flow Structures in Nonequilibrium Plasmas .....	<i>J. P. Trelles</i>	2852
Ion Energy and Angular Distributions in a Dual-Frequency Capacitively Coupled Chlorine Discharge .....	<i>S. Huang and J. T. Gudmundsson</i>	2854
Smoothing of Discharge Inhomogeneities at High Currents in Gasless High Power Impulse Magnetron Sputtering .....	<i>J. Andersson, P. Ni, and A. Anders</i>	2856
Study on Plasma Uniformity Using 2-D Measurement Method in Argon Inductively Coupled Plasmas .....	<i>Y.-C. Kim, H.-C. Lee, and C.-W. Chung</i>	2858
Reconstruction of 3-D Radiation Profile From 2-D Images Viewed by IR Imaging Video Bolometers With SVD .....	<i>R. Sano, B. J. Peterson, M. Kobayashi, M. Teranishi, N. Iwama, K. Mukai, and S. N. Pandya</i>	2860
Evolution of Radiation Distribution With RMP Assisted Detachment in LHD .....	<i>B. J. Peterson, S. N. Pandya, M. Kobayashi, K. Mukai, and R. Sano</i>	2862
3-D Simulation of Low-Temperature Plasma Development Under Pulsed Conditions .....	<i>A. S. Fierro, J. C. Dickens, and A. A. Neuber</i>	2864
Stepping Development of 6-m Long-Gap Discharge Produced by Standard Switching Impulse .....	<i>Q. Xie, Y. Ding, Z. Zhang, Y. Peng, H. Sun, and F. Lü</i>	2866
Effect of Pulse Rise Time on Plasma Plume Propagation Velocity .....	<i>W. Gong, Q. Huang, Z. Wang, and Y. Yang</i>	2868

---