

## **NATALIA YU. BABAEVA**

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**Natalia Yu. Babaeva** received the M.S. degree (with honors) in physics and engineering from the Moscow Institute for Physics and Technology (MIPT), Moscow, Russia, in 1982 and the Ph.D. degree in Physics and Mathematics (with specialization in plasma physics and plasma chemistry) from the Russian Academy of Sciences, Moscow, in 1993. She was a Research Professor with the Pohang University of Science and Technology, Pohang, Korea, from 2001 to 2005. In January 2005, she joined Iowa State University, Ames, as a Research Scholar and in September 2008 she joined University of Michigan, Ann Arbor, as a Visiting Research Scientist. She has authored 28 published journal papers and authored or coauthored 63 proceedings abstracts on topics related to plasma and electric discharges, including RFs, glows, dielectric barriers, and streamer discharges. Dr. Babaeva received the American Association for the Advancement of Science/National Science Foundation Best Russian Woman-Scientist Award in Physics in 1999. From July 2007 to June 2008 she was the Co-Guest Editor of Special Issue on “Images in Plasma Science” of *IEEE Transactions on Plasma Science*.

### **EDUCATION**

- M.S. with Honors, 1982, General Physics and Radiophysics, Moscow Institute for Physics and Technology (MIPT)
- Ph.D. in Physics and Mathematics (specialization field: Plasma Physics and Plasma Chemistry), 1993, Institute for High Temperatures, Russian Academy of Sciences.  
**Dissertation Title:** Numerical modeling of gas dynamics phenomena in non-equilibrium plasmas of glow and microwave discharges.

### **LANGUAGES**

- Russian
- English
- German (read, write)
- French (read with dictionary)

### **PROFESSIONAL EXPERIENCE**

**Sept 2008 – present : Research Scientist, University of Michigan**

- High pressure plasma for medical and environmental applications: corona discharges, streamer branching in dense media.

- HID lamps modeling and two-dimensional plasma code development. Advising industrial collaborators with University of Michigan.

**July 2007-June 2008: Co-Guest Editor, Special Issue on "Images in Plasma Science", *IEEE Transactions on Plasma Science***

- N. Yu. Babaeva and M. J. Kushner, "Guest Editorial: 5th Triennial Special Issue of Transactions on Plasma Science on Images in Plasma Science", Trans. Plasma Sci. **36**, 862 (2008).

**2005 – August 2008: Postdoctoral Researcher, Department of Electrical and Computer Engineering, Iowa State University, USA**

- Moderate and high pressure plasma: Chemical-Oxygen-Iodine Lasers, corona discharges, streamer branching
- Low-pressure plasma: Capacitively Coupled Radio Frequency Plasma Sources, including Magnetically Enhanced Reactive Ion Etchers.
- Two-dimensional fluid code development: ion momentum, plasma chemistry Monte Carlo, magnetized plasma.
- Mentoring undergraduate students:  
 Laura Miller (ISU), Modeling of Plasma Bullets Plasma Plume for bio-medical applications.  
 Samantha Eisheid (ISU), Modeling High Density Chemical Vapor Deposition.  
 Luis A. Garcia (ISU): Plasma Excited Chemical-Oxygen-Iodine Lasers: Optimizing Injection and Mixing for Positive Gain

**2001 - 2005: Research Assistant Professor, Department of Electronic and Electrical Engineering, Pohang University of Science and Technology, South Korea**

- Modeling of Capacitively Coupled Radio Frequency Plasma Sources
- Particle-in-cell/Monte Carlo and two-dimensional fluid code development for single- and dual radio frequency source.
- Modeling of dusty plasma
- Teaching at undergraduate and postgraduate level.

**1993 – 2001: Senior Research Scientist, Institute for High Temperatures, Russian Academy of Sciences**

- Modeling of dynamics of electric discharges, including glow, corona, microwave, streamer discharges and dielectric barrier discharges
- Modeling of chemical processes in weakly ionized plasmas, particularly for environmental applications
- Modeling of gas dynamic phenomena in non-equilibrium plasmas of glow and microwave discharges, particularly shock wave propagation and structure in gas discharge plasmas
- Development of accurate numerical methods for modelling electric discharge and gas dynamic phenomena
- Supervising work of graduate students and research associates

**1992 – 1993: Research Scientist: Institute for High Temperatures, Russian Academy of Sciences**

**1986 – 1991: Junior Research Scientist: Institute for High Temperatures, Russian Academy of Sciences**

**1982 – 1986: Postgraduate Research Associate, Moscow Institute for Physics and Technology**

- Modeling of propagation of electromagnetic waves in non-uniform and nonlinear media

## **AWARDS/RECOGNITION**

- **October-December 2000: Invited Guest Researcher of the German Academic Exchange Service (DAAD) under the program - Study visits for foreign academics to the Federal Republic of Germany, Aachen University of Technology, Gasentladungstechnik, Aachen, Germany.**  
Research work on dielectric barrier discharge modelling (discharges on surfaces of dielectric) (with Univ. Prof.Dr. rer. nat. G. Pietsch, Grundgebiete Der Elektrotechnik Und Gasentladungstechnik).
- **October-November 1999:**  
AAAS and NSF, Best Russian woman-scientist award (trip to USA).
- **May - July 1997: Invited Guest Researcher, Eindhoven University of Technology, Eindhoven, the Netherlands**  
Research work on streamer modeling in dense media, destroying phenols and biological contaminating agents in water (with Dr.ir. E.M. van Veldhuizen, Department of Technical Physics, Division of Particle Physics)

## **PROFESSIONAL INTERESTS:**

- Plasma physics; plasma chemistry; computational physics for various types of gas discharges including RF discharges. Developing computer codes (Fluid and Particle-in-Cell) addressing low pressure (1 mTorr to 10 Torr) and high pressure (up to a few atm) plasma equipment.
- Proficient in FORTRAN and C/C++ languages.

## **PUBLICATIONS AND PRESENTATIONS**

### **BOOK CHAPTERS**

1. N. Babaeva and G. Naidis, “Modeling of Streamer Propagation,” in: *Electrical Discharges for Environmental Purposes: Fundamentals and Applications*, (ed. E.M.van Veldhuizen), Nova Science Publishers, Inc., Huntington, New York, Chapter 3, pp.21-48, 2000.

2. S. J. Kim, F. Iza, N. Babaeva, S.H. Lee, H.J. Lee, and J. K. Lee "Advanced Simulations for Industrial Plasma Applications", in *Advanced Plasma Technology* by R. D'agostino, P. Favia, and Y. Kawai, Wiley (2007).

#### ARTICLES IN REFEREED JOURNALS:

1. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Dynamics of nitrogen discharges in the beams of microwave radiation," *Fiz. Plazmy* **18**, 1055-1063 (1992) (in Russian) (Engl.Transl.: *Sov. J. Plasma Phys.*, **18**, 549-554 (1992)).
2. N. Babaeva, "On the structure of shock and blast waves in nonequilibrium plasma of gas discharge," *Russian Journal Chem. Phys.* **12**, 357-360 (1993) (in Russian).
3. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Simulation of shock wave propagation in a gas discharge developing in nitrogen," *High Temperatures* **31**, 670-673 (1993) (in Russian) (Engl.Transl.: *High Temperature* **31**, 617-620 (1993)).
4. N. Babaeva and G. Naidis, "Simulation of positive streamers in air in weak uniform electric fields," *Phys.Lett.A* **215**, 187-190 (1996).
5. N. Babaeva and G. Naidis, "Two-dimensional modelling of positive streamer dynamics in nonuniform electric fields in air", *J.Phys.D: Appl.Phys.* **29**, 2423-2431 (1996).
6. N. Babaeva and G. Naidis, "Dynamics of positive and negative streamers in air in weak uniform electric fields", *IEEE Trans. Plasma Science* **25**, 375-379 (1997).
7. N. Babaeva and G. Naidis, "2D modeling of positive streamer propagation in flue gases in sphere-plane gaps", *IEEE Trans. Plasma Science* **26**, 41-45 (1998).
8. N. Babaeva and G. Naidis, "Simulation of positive streamers in liquefied argon", *Tech. Phys. Lett.* **25**, No.3, 19-27 (1999).
9. Van Veldhuizen E.M., Rutgers W.R., Hoeben W.F.L.M., Baede A.H.F.M., Babaeva N.Yu., *Progress in Plasma Processing of Materials* 1999, eds. Fauchais J., Amouroux J., New York: Begell House, ISBN 1-56700-126-2, 493
10. N. Yu. Babaeva and G. V. Naidis, "Modelling of Prebreakdown Phenomena in High-Pressure Gases", *J. Electrostatic* **53**, No.2, 123-133 (2001).
11. N. Babaeva and G. Naidis, "Simulation of stepped propagation of positive streamers in SF<sub>6</sub>", *J. Phys. D: Appl. Phys.* **35**, 132-136 (2002).
12. N. Yu. Babaeva, J. K. Lee and H.C.Kim, "Non-stationary charging of a dust grain in decaying streamer-channel plasma", *Plasma Sources Sci. Technol.* **13**, 127– 34 (2004).
13. J. K. Lee, N. Yu. Babaeva, H. C. Kim, O. V. Manuilenko, and J. W. Shon, "Simulation of Capacitively Coupled Single- and Dual-Frequency RF Discharges", *IEEE Trans. Plasma Sci.* **32**, 47-53 (2004).
14. N. Yu. Babaeva and J. K. Lee, "Dust Grain Charging in Developing Air Plasma", *IEEE Trans. Plasma Sci* **32**, 823-828 (2004).
15. J. K. Lee , O. V. Manuilenko, N. Yu. Babaeva, H. C. Kim, and J. W. Shon, "Ion Energy Distribution Control in Single and Dual Frequency Capacitive Plasma Sources", *Plasma Sources Sci. Technol.* **14**, 89-97 (2005).

16. N. Yu. Babaeva, J K Lee and J W Shon, "Capacitively coupled plasma source operating in Xe/Ar mixtures", J. Phys. D: Appl. Phys. **38**, 287-299 (2005).
17. N. Yu. Babaeva, J. K. Lee, J. W. Shon and E. A. Hudson, "Ion Energy Distributions: Role of Ionization, Resonant and Non-Resonant Charge Exchange Collisions", J. Vac. Sci Technol. A **23**, 799-704 (2005).
18. R. Arakoni, D. S. Stafford, N. Yu. Babaeva and M. J. Kushner "O<sub>2</sub>(<sup>1</sup>Δ) Production in Flowing He/O<sub>2</sub> Plasmas: II. 2-dimensional Modeling", J. Appl. Phys. **98**, 073304 (2005).
19. N. Yu. Babaeva, A. N. Bhoj and Mark J. Kushner, "Streamer Dynamics in Gases Containing Dust Particles", Plasma Sources Sci. Technol. **15**, 591-602 (2006).
20. N. Yu. Babaeva, R. A. Arakoni and Mark J. Kushner, "Production of O<sub>2</sub>(<sup>1</sup>Δ) in Flowing Plasmas Using Spiker-Sustainer Excitation", J. Appl. Phys. **99**, 113306 (2006).
21. N. Yu. Babaeva and M. J. Kushner, "Penetration of Plasma into the Wafer-Focus Ring Gap in Capacitively Coupled Plasmas", J. Appl. Phys. **101**, 113307 (2007).
22. N. Yu. Babaeva, R. A. Arakoni and Mark J. Kushner, "O<sub>2</sub>(<sup>1</sup>Δ) Production in High Pressure Flowing He/O<sub>2</sub> Plasmas: Scaling and Quenching", J. Appl. Phys. **101**, 123306 (2007).
23. R. A. Arakoni, N. Yu. Babaeva, and Mark J. Kushner, "O<sub>2</sub>(<sup>1</sup>Δ) Production and Gain in Plasma Pumped Oxygen-Iodine Lasers: Consequences of NO and NO<sub>2</sub> Additives", J. Phys. D: Appl. Phys. **40**, 4793-4809 (2007).
24. N.Yu. Babaeva and Mark J. Kushner, "Ion Energy and Angular Distributions into the Wafer-Focus Ring Gap in Capacitively Coupled Discharges", J. Phys. D: Appl. Phys. **41**, 062004 (2008).
25. N.Yu. Babaeva and Mark J. Kushner, "Streamer Branching: The Role of Inhomogeneities and Bubbles", IEEE Trans. Plasma Sci, **36**, 892-893 (2008).
26. N. Yu. Babaeva and M. J. Kushner, "Guest Editorial: 5th Triennial Special Issue of Transactions on Plasma Science on Images in Plasma Science", Trans. Plasma Sci. **36**, 862 (2008).
27. N.Yu. Babaeva and Mark J. Kushner, "Effect of Inhomogeneities On Streamer Propagation Part I: Intersection with Isolated Bubbles and Particles" Plasma Sources Sci. Technol **18**, 035009 (2009).
28. N.Yu. Babaeva and Mark J. Kushner, "Effect of Inhomogeneities On Streamer Propagation Part II: Streamer Dynamics in High Pressure Humid Air with Bubbles", Plasma Sources Sci. Technol **18**, 035009 (2009).
29. N.Yu. Babaeva and Mark J. Kushner, "Structure of positive streamers inside gaseous bubbles immersed in liquids", J. Phys. D: Appl. Phys. **42**, in print (2009).

## CONFERENCE AND WORKSHOP PRESENTATIONS WITH PROCEEDINGS

1. N. Babaeva, A. Mnatsakanyan, and G. Naidis, "On the mechanism of microwave discharge propagation along the electromagnetic ray in nitrogen", Proceedings of 2nd All Union

- Workshop "Discharges in Microwave fields", Kuybishev, USSR, June 1989, 29 (1989) (in Russian).
2. N. Babaeva, A. Mnatsakanyan and G. Naidis, "On the propagation of microwave discharge in nitrogen towards the source of electromagnetic radiation", Proceedings of the 19th International Conference on Phenomena in Ionized Gases, Belgrade, July 1989, 432-433 (1989).
  3. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Shock wave propagation through the region of vibrationally - nonequilibrium molecular gases", Proceedings of 1st All Union Seminar "Interaction of Acoustic Waves With Plasma", Erevan, USSR, May 1989, 29-30 (1989) (in Russian).
  4. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Modelling of impulse discharge in microwave fields in nitrogen", Proceeding of the International Workshop "Strong Microwaves in Plasma", Suzdal, USSR, July 1990, D18 (1990).
  5. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Breakdown and discharge propagation in microwave fields in inert and molecular gases", Proceedings of 3rd International Conference on Properties and Applications of Dielectric Materials, Tokyo, Japan, July 1991, 832-835 (1991).
  6. N. Babaeva, A. Mnatsakanyan and Naidis, "Electron concentration in impulse microwave discharge in nitrogen", Proceedings of the 8th All Union Conference on Low Temperature Plasma, Minsk, USSR, September 1991, 3-4 (1991) (in Russian).
  7. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Modelling of shock wave propagation in developing discharge", Proceedings of 2nd All Union Seminar "Interaction of Acoustic Waves with Plasma", Erevan, USSR, May 1991, 68 (1991) (in Russian).
  8. N. Babaeva, A. Mnatsakanyan and G. Naidis, "Modelling of shock wave propagation in developing discharge in nitrogen", Proceedings of the 19th International Symposium on Shock Waves, Marseille, France, July 1993, 2, 387-390 (Springer-Verlag, 1995).
  9. N. Babaeva, A. Mnatsakanyan and Naidis, "Modelling of weak shock wave propagation in gas discharge plasma", Proceedings of the 21st International Conference on Phenomena in Ionized Gases, Bochum, Germany, July 1993, 273-274 (1993).
  10. N. Babaeva, A. Mnatsakanyan, A. Kulikovsky and G. Naidis, "On the use of pulsed streamer corona discharge for removal of toxic components in gas mixtures", Proceedings of International Symposium on Heat and Mass Transfer in Chemical Processes and Industry Accidents, Rome, Italy, September 1994, par # 26 (1994).
  11. N. Babaeva G. and Naidis, "2D model of streamer propagation in nonuniform electric fields", Proceedings of the 11th International Conference on Gas Discharges and Their Applications, Tokyo, Japan, vol. 2, 488-491 (1995).
  12. N. Babaeva and G. Naidis, "Modelling of streamers in air", Proceedings of the Conference on Low Temperature Plasma, Petrozavodsk, Russia, June 1995, 379-384 (1995) (in Russian).

13. N. Babaeva and G. Naidis, "Two-dimensional simulation of positive and negative streamers in air", Proceedings of the 5th International Symposium on High Pressure Low Temperature Plasma Chemistry, Milovy, Czech Republic, September 1996, 128-133 (1996).
14. N. Babaeva and G. Naidis, "2D simulation of positive streamers in sphere-plane gaps in air", Proceedings of the 13th European Sectional Conference on the Atomic and Molecular Physics of Ionised Gases (ESCAMPIG 96), Poprad, Slovakia, August 1996, 129-130 (1996).
15. N. Babaeva and G. Naidis, "Simulation of positive streamer propagation in flue gases", Proceedings of the 23rd International Conference on Phenomena in Ionized Gases, Toulouse, France, July 1997, vol. 2, 246-247 (1997).
16. N. Babaeva and G. Naidis, "On plasma chemical efficiency of impulse corona discharges", Proceedings of the Conference on Low Temperature Plasma, Petrozavodsk, Russia, June 1998, 637-639 (1998) (in Russian).
17. N. Babaeva and G. Naidis, "Modelling of streamer dynamics in gases and liquids", Proceedings of the Conference on Low Temperature Plasma, Petrozavodsk, Russia, June 1998, 547-550 (1998) (in Russian).
18. N. Babaeva and G. Naidis, "Comparison of Streamer Structure in Atmospheric Air, SF<sub>6</sub> and Liquefied Argon", Proceedings of the 14th European Sectional Conference on the Atomic and Molecular Physics of Ionised Gases (ESCAMPIG 98), Ireland, August 1998, 282-283 (1998).
19. N. Babaeva G. and Naidis, "Simulation of positive streamers in liquid argon and xenon", Proc. 1999 IEEE 13th Int. Conf. on Dielectric Liquids, Nara, Japan, 1999, 437-440 (1999).
20. N. Babaeva and G. Naidis, "Simulation of Shock Wave Propagation in Gas Discharge Plasma Regions", The workshop "Perspectives of MHD and plasma technologies in aerospace applications", Moscow, March 24-25, 1999, 108-111 (1999).
21. N. Babaeva and G. Naidis, "Shock Wave Propagation Through Nonuniform and Nonequilibrium Gas Regions", Paper AIAA 99 - 4942. AIAA 9th International Space Planes & Hypersonic Systems & Technologies Conference and Weakly Ionized Gases Workshop, Norfolk, VA, November 1999.
22. Babaeva, N. and Naidis, G. (2000): Dynamic and Structure of Microwave Discharges in Nitrogen. The 2<sup>nd</sup> workshop on magneto-plasma-aerodynamics in aerospace applications', Moscow, April 5-7, 2000, p.57.
23. N. Babaeva and G. Naidis, "On Streamer Dynamics in Dense Media", Proc. 2nd Int. Workshop "Electrical Conduction, Convection and Breakdown in Fluids", 87-90, Grenoble, France, 4-5 May, 2000.
24. V. A. Bityurin, N. Yu. Babaeva, A. N. Bocharov, G. V. Naidis, G. J. Cliteur, T. Shinkai, "SF<sub>6</sub> circuit-breaker arc simulation around current zero with account of thermal and chemical non-equilibrium", Proc. XIII Int. Conf. on Gas Discharges and their Applications, Glasgow, 2000, vol. I, 78-81 (2000).
25. V. A. Bityurin, N. Yu. Babaeva, A. N. Bocharov, G. V. Naidis, G. J. Cliteur, T. Shinkai, "SF<sub>6</sub> circuit-breaker arc 2D simulation around current zero", Proc. XIII Int. Conf. on Gas Discharges and their Applications, Glasgow, 2000, vol. I, 70-73 (2000).

26. N. Yu. Babaeva and G. V. Naidis, "Modelling of Prebreakdown Phenomena in High-Pressure Gases", Hakone VII, 2000.
27. G. V. Naidis, N. Yu. Babaeva and V. A. Bityurin, "Dynamics of air heating in pulsed microwave discharges", The 3<sup>rd</sup> Workshop on magneto-plasma-aerodynamics in aerospace applications', Moscow, April 24-26, (2001).
28. G. V. Naidis, N. Yu. Babaeva and V. A. Bityurin, "Part I. Dynamic of Microwave Discharges in Nitrogen; Part II. Dynamics of air heating in pulsed microwave discharges", AIAA –Paper 2001-3086, 32<sup>nd</sup> AIAA Plasmadynamics and Lasers Conference and 4<sup>th</sup> Weakly Ionized Gases Workshop, 11-14 June 2001, Anaheim, CA (2001).
29. N. Yu. Babaeva and G. V. Naidis, "On dynamics of stepped streamer propagation", Proc. 15<sup>th</sup> Int. Symposium on Plasma Chemistry, Vol.I, Oral contributions, p. 91-96, Orleans 9-13 July, France (2001).
30. N. Yu. Babaeva and G. V. Naidis, "Computer simulation of ozone production in surface discharges", Proc. 15<sup>th</sup> Int. Symposium on Plasma Chemistry, Vol.II, Oral contributions, p.449-454, Orleans 9-13 July, France, 2001.
31. N. Yu. Babaeva, G. V. Naidis and G. Pietsch, "Simulation of Positive Barrier Discharges on a Dielectric Surface", Proceedings of the 25<sup>th</sup> Int. Conf. on Phenomena in Ionized Gases, Vol. IV, p.31-32, July 17-22, Nagoya, Japan, 2001.
32. N. Yu. Babaeva, J. K. Lee and H. C. Kim, "Fluid model for one- and two-frequency Ar RF discharge", XXVI Int. Conf. Phenomena in Ionized Gases, July 15-20, Greifswald, Germany, 2003.
33. N. Yu. Babaeva, J. K. Lee and H. C. Kim, "Non-stationary charging of a dust grain in decaying plasma of the streamer channel", XXVI Int. Conf. Phenomena in Ionized Gases, July 15-20, Greifswald, Germany, 2003.
34. N. Babaeva, H. C. Kim, O. Manuilenko and J. K. Lee, "Analytic Model and Simulation of Single- and Dual-Frequency Capacitively Coupled RF Discharges", (Invited talk), Korean Phys. Soc.-KPS, Fall Meeting, Daegu, Korea 2003.
35. O. V. Manuilenko, N. Yu. Babaeva, H. C. Kim and J.K. Lee, "Particle-in-cell/Monte Carlo Simulation of a Single and Dual Frequency Capacitive RF Discharges: pure Ar and Ar/O<sub>2</sub>, Ar/Xe mixtures", Proceedings of International COE Forum on Plasma Science and Technology, April 5-7, 2004, Nagoya, Japan (2004).
36. N. Yu. Babaeva, J. K. Lee, J. W. Shon and E. Hudson, "Ion energy distribution at the electrodes: the role of ionisation, resonant and non-resonant charge exchange collisions", Proceedings of 7<sup>th</sup> APCPST (Asia Pacific Conference on Plasma Science and Technology) and 17<sup>th</sup> SPSM (Symposium on Plasma Science for Materials), Oral contributions, p.56, June 29-July 2, Fukuoka, Japan, 2004.
37. N. Yu. Babaeva, J. K. Lee, H.C. Kim and J. W. Shon, "Non-monotonous plasma density behavior in dual frequency asymmetric capacitively coupled plasma source", Proceedings of 7<sup>th</sup> APCPST (Asia Pacific Conference on Plasma Science and Technology) and 17<sup>th</sup> SPSM (Symposium on Plasma Science for Materials), p.423, June 29 - July 2, Fukuoka, Japan, 2004.



38. O. V. Manuilenko, N. Yu. Babaeva, H. C. Kim and J.K. Lee, "Dual-frequency capacitively coupled discharges: theories and modelings", (Invited talk), Proceedings of 7<sup>th</sup> APCPST (Asia Pacific Conference on Plasma Science and Technology) and 17<sup>th</sup> SPSM (Symposium on Plasma Science for Materials), p.59, June 29 - July 2, Fukuoka, Japan, 2004.
39. N. Yu. Babaeva, Mark J. Kushner and J. K. Lee, "Assymmetric Capacitively Coupled Plasma Sources with Clean and Contaminated Electrodes", 32<sup>nd</sup> IEEE International Conference on Plasma Science, Monterey, CA, June 2005.
40. A. Bhoj, N. Yu Babaeva, R. Arakoni and M. J. Kushner, "Plasmas in (and around) Small Places", Proceedings of International Conference on Phenomena in Ionized Gases, Veldhoven, The Netherlands, July 2005.
41. N. Yu. Babaeva and Mark J. Kushner, "Streamer Dynamics in Gases Containing Dust Particles", Proceedings of International Conference on Phenomena in Ionized Gases, Veldhoven, The Netherlands, July 2005.
42. N.Yu. Babaeva, J. K. Lee and Mark J. Kushner, "Characteristics of Asymmetric Capacitively Coupled Plasma Sources Operating with Clean and Contaminated Electrodes", Proceedings of 17th International Symposium on Plasma Chemistry, Toronto, Canada, August 2005.

#### **CONFERENCE AND WORKSHOP PRESENTATIONS WITH ABSTRACTS ONLY**

1. N. Babaeva and G. Naidis, "2D modelling of positive streamers in air in sphere-plane gaps", Abstracts of the 8th All Russian Conference on Gas Discharge Physics, Ryazan, Russia, June 1996, 109-111 (1996) (in Russian).
2. N. Babaeva and G. Naidis, "Dynamic of positive and negative streamers in weak uniform fields in air", Abstracts of 8th All Russian Conference. on Gas Discharge Physics, Ryazan, Russia, June 1996, 111-112 (1996) (in Russian).
3. N. Yu. Babaeva, J. K. Lee and H. C. Kim, "Interaction of an ionization wave with dust structures in plasma" Joint International Plasma Symposium of 6<sup>th</sup> APCPST, 15<sup>th</sup> SPSM, OS 2002 and 11<sup>th</sup> KAPRA (oral presentation), July 1-4, 2002, Jeju island, Korea (2002).
4. N. Yu. Babaeva, J. K. Lee, J. W. Shon and E. Hudson, "Ion energy distribution at the electrodes: the role of ionization, resonant and non-resonant charge exchange collisions", 57<sup>th</sup> Gaseous Electronic Conference, Sept. 26 – 29, Bunratty, Ireland, 2004.
5. N. Yu. Babaeva, S. J. Kim, G. Y. Park, and J. K. Lee, "Attachment cooling of electrons in oxygen-argon and SF<sub>6</sub>-argon mixtures", 57<sup>th</sup> Gaseous Electronic Conference, Sept. 26 – 29, Bunratty, Ireland, 2004.
6. Natalia Yu Babaeva, Mark J. Kushner and J. K. Lee, "Asymmetric Capacitively Coupled Plasma Sources with Clean and Contaminated Electrodes", 32nd International Conference on Plasma Science, Monterey, CA, June 2005.
7. N. Yu. Babaeva and Mark J. Kushner, "Streamer dynamics in a media containing dust particles", 32<sup>nd</sup> IEEE International Conference on Plasma Science, Monterey, CA, June 2005.

8. N. Yu. Babaeva, R. Arakoni and Mark J. Kushner, "Excitation of  $O_2(1-\delta)$  in Pulsed Radio Frequency Flowing Plasmas for Chemical Oxygen Iodine Lasers", 58th Gaseous Electronics Conference, San Jose, CA, October 2005.
9. A. N. Bhoj, N. Babaeva and Mark J. Kushner, "Functionalization of Surfaces by Plasmas at Low and High Pressure", 6th International Conference on Reactive Plasmas and 23rd Symposium on Plasma Processing, Sendai, Japan, January 2006.
10. N. Yu Babaeva, R. A. Arakoni and M. J. Kushner, "Strategies for Higher Yields of  $O_2(1\Delta)$  at Higher Pressures for Electrical Excited Chemical Oxygen Iodine Lasers," Workshop on Electrically Excited COIL Lasers, Albuquerque, NM, May 2006.
11. N. Yu. Babaeva, R. Arakoni and Mark J. Kushner, "Optimization of  $O_2(1-\Delta)$  Yields in Pulsed RF Flowing Plasmas for Chemical Oxygen Iodine Lasers", 33rd IEEE International Conference on Plasma Science, Traverse City, MI, June 2006.
12. N. Yu. Babaeva and Mark J. Kushner, "Wafer Edge Effects Considering Ion Inertia In Capacitively Coupled Discharges", 33rd IEEE International Conference on Plasma Science, Traverse City, MI, June 2006.
13. N. Yu. Babaeva and Mark J. Kushner, "Penetration of Plasma into the Wafer-Focus Ring Gap", 2006 Gordon Research Conference on Plasma Processing Science, Mount Holyoke College, South Hadley, MA, July 2006.
14. R. Arakoni, N. Yu. Babaeva, and Mark J. Kushner, " $O_2(1-\Delta)$  Production and Oxygen-Iodine Kinetics in Flowing Afterglows for Electrically Excited Chemical-Oxygen-Iodine Lasers", 59th Gaseous Electronics Conference, Columbus, OH, October 2006.
15. N. Yu. Babaeva, and Mark J. Kushner, "Edge Effects in Reactive Ion Etching: The Wafer-Focus Ring Gap", AVS 53<sup>rd</sup> International Symposium and Exhibition, San Francisco, CA, November 2006.
16. N. Yu. Babaeva, R. Arakoni, and Mark J. Kushner, " $O_2(1-\Delta)$  Production In High Pressure Flowing He/ $O_2$  Plasmas: Scaling and Quenching", 34<sup>th</sup> IEEE International Conference on Plasma Science, Albuquerque, New Mexico, June 2007.
17. Ramesh A. Arakoni, Natalia Y. Babaeva and Mark J. Kushner, "  $O_2(1-\delta)$  and  $I(2-P-1/2)$  Production in Flowing Afterglows for Oxygen-Iodine Lasers: Effect of NO/ $NO_2$  Additives ", 34th International Conference on Plasma Science, Albuquerque, NM June 2007.
18. N. Y. Babaeva, L. A. Garcia, R. A. Arakoni and M. J. Kushner " Plasma Excited Chemical-Oxygen-Iodine Lasers: Optimizing Injection and Mixing for Positive Gain ", 60th Gaseous Electronics Conference, Washington, DC, October, 2007.
19. N. Y. Babaeva and Mark J. Kushner, " Ion Energy and Angular Distributions into Small Features in Plasma Etching Reactors: The Wafer-Focus Ring Gap ", 54th International Symposium of the American Vacuum Society, Seattle, WA, October 2007.
20. N. Y. Babaeva and Mark J. Kushner, "Investigations of Magnetically Enhanced RIE Reactors with Rotating Magnetic Fields", 61st Annual Gaseous Electronics Conference, Dallas, Texas, October 13–17, 2008.

21. N. Y. Babaeva and Mark J. Kushner, “Branching Patterns in Multi-Atmospheric Pressure Corona Discharges With Positive and Negative Bubbles”, 61st Annual Gaseous Electronics Conference, Dallas, Texas, October 13–17, 2008.
22. N. Y. Babaeva, Session Chair, “Collision Data For and From Plasma Applications”, 61st Annual Gaseous Electronics Conference, Dallas, Texas, October 13–17, 2008.
23. N. Y. Babaeva and Mark J. Kushner, “Ion energy distributions to particles in corona discharges”, 36th IEEE International Conference on Plasma Science, San Diego, California , May 31 – June 5, 2009.

#### **INVITED TALKS:**

N. Babaeva, H. C. Kim, O. Manuilenko and J. K. Lee, “Analytic Model and Simulation of Single- and Dual-Frequency Capacitively Coupled RF Discharges”, (Invited talk), Korean Phys. Soc.-KPS, Fall Meeting, Daegu, South Korea 2003.

O. V. Manuilenko, N. Yu. Babaeva, H. C. Kim and J.K. Lee, “Dual-frequency capacitively coupled discharges: theories and modelings”, (Invited talk), Proceedings of 7<sup>th</sup> APCPST (Asia Pacific Conference on Plasma Science and Technology) and 17<sup>th</sup> SPSM (Symposium on Plasma Science for Materials), p.59, June 29 - July 2, Fukuoka, Japan, 2004.