Alexey B. Nadykto, Ph.D.

Senior Research Scientist

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Sex	male

Education

2001 Ph.D. (Environmental Physics), University of Kuopio, Kuopio, Finland (with Prof. M. Kulmala and A. Laaksonen)

Thesis Title: Nadykto A.B. Condensational growth and evaporation of liquid droplets and ice particles in non-isothermal gas mixtures. *Report Series in Aerosol Science*, 53, 1-65, 2001 (book)

1999 Ph.D. (Physics & Mathematics), L.Karpov Institute of Physical Chemistry, Moscow, Russia (with Prof. E.D. Shchukin)

Thesis Title: The formation and evolution of high temperature aerosols.

1997 M.Sc. (Quantum Physics), Moscow State University, Moscow, Russia (with Prof. G.Ya. Korenman)

Thesis Title: A potential of the interaction between exotic antiprotonic helium atom at long-lived metastable states and helium atom in a gaseous media

Employment

09/2005- Senior Research Scientist, State University of New York, ASRC, Albany, New York, USA

03/2002-09/2005 Research Scientist, State University of New York, ASRC, Albany, New York, USA

07/2001 - 12/2001 Visiting Scientist, University of Helsinki, Department of Physics, Helsinki, Finland

09/1999 - 06/2001 Postdoctoral Fellow of Academy of Finland, University of Kuopio, Department of Applied Physics, Kuopio, Finland

09/1998 -07/1999 Assistant Professor/Lecturer, Moscow Power Engineering Institute and Moscow State Industrial University, Department of Physics. Moscow.

01/1997 – 02/1999, Ph.D. student, L. Karpov Physico-Chemical Institute, Moscow.

Organizational & Other Professional Activities

10/2008 Program and Organizing Committee member, Conference "Mathematical Models of Non-Linear Phenomena, Processes and Systems", Moscow, Russia,

08/2006 Session chair, VII International Aerosol Conference, Saint Paul, MN, USA

06/2002 Program Committee member, "V International Congress on Mathematical Modeling", Dubna, Russia

09/2000 Organizing Committee member, "IV International Conference Non-Linear Excitations, Transfer, Dynamics and Control in Condensed Systems and Other Media", Moscow, Russia

Reviewer for

Physical Review, Journal of Physical Chemistry A B, Journal of Geophysical Research, Aerosol Science and Technology, Boreal Environmental Research.

Invited Contributions

4 invited talks and 2 invited reviews.

Primary Research Interests/Field of Expertise

I. Thermochemistry and kinetics of gas-to-cluster and cluster-to-bulk phase transitions, structure of molecular clusters and their thermodynamic, spectroscopic and dipolar properties studied using both classical and quantum (*ab initio* and DFT) methods, with a focus on the impact of molecular and nano-scale processes on the evolution of larger (macro-scaled) systems ;

II. Nucleation theory, including extension of classical (statistical) models and application of quantum methods for solving problems in multicomponent nucleation theory;

III. Microphysics of atmospheric species relevant to climate changes via indirect impact, including the role of charge- and dipole related interactions in the uptake of atmospheric species by pre-existing particles and formation of nano- and ultrafine particles;

IV. Non-linear dynamics of gases, including diffusion and heat transport processes in high temperature aerosols with and without internal heat sources, condensational growth/evaporation of spherical droplets and non-spherical ice crystals in different temperature and concentration regimes in multicomponent gaseous mixtures, and heterogeneous combustion of aerosol particles.

Publications

Editor

1. Nadykto, A. B., L.A. Uvarova, A.V. Latyshev, *Mathematical Models of Non-Linear Phenomena, Processes and Systems* , Nova Science Publishers, NY, USA, 2009 (IV Quarter)

Invited Contributor

2. Nadykto, A. B., A. Al Natsheh, F. Yu, K.V. Mikkelsen, and J. Herb, Computational Quantum Chemistry: A New Approach to Atmospheric Nucleation, Advances in Quantum Chemistry, 55, 449-478, 2008 (Review)
3. Nadykto, A. B., and F. Yu, Thermochemistry of Nucleating Clusters: A Bridge between the Quantum World and Planetary Atmosphere, in *Thermochemistry: New Research,* Nova Science Publishers, in press, 2008
4. Nadykto, A. B., F. Yu, and J. Herb, Towards understanding the sign preference in binary atmospheric nucleation, Physical Chemistry Chemical Physics, 2008 DOI:10.1039/B807415A.

Letters and Communications

5. Nadykto, A.B. and F.Yu, Strong hydrogen bonding between atmospheric nucleation precursors and common organics, *Chemical Physics Letters, 435, 1-3,* 14-18, 2007
6. Nadykto, A. B., A. Al Natsheh, F. Yu, K.V. Mikkelsen, and J.Ruuskanen, Comment, Reply, *Physical Review Letters,* 98**,** 109604, 2007.
7. Nadykto, A. B., A. Al Natsheh, F. Yu, K.V. Mikkelsen, and J.Ruuskanen, Quantum nature of the sign preference in the ion-induced nucleation, *Physical Review Letters*, 96, 125701, 2006
8. Al Natsheh, A., A. B. Nadykto, K. V. Mikkelsen, F. Yu, and J. Ruuskanen, Coexistence of metastable nitric acid dihydrates: A molecular level contribution to understanding the polar stratospheric clouds crystals formation, *Chemical Physics Letters*, 426, 20-25, 2006.
9. Nadykto, A.B. and F. Yu, Dipole moment of condensing monomers: A new parameter controlling the ion-induced nucleation, *Physical Review Letters. 93*, 016101, 2004
10. Nadykto A.B., J. Mäkelä, F. Yu, M. Kulmala and A. Laaksonen, Comparison of the experimental mobility equivalent diameter for small cluster ions with theoretical particle diameter corrected by effect of vapour polarity, *Chemical Physics Letters*, 382/1-2, 6-11, 2003.

Peer-Reviewed Journal Articles and Book Chapters

11. Nadykto, A. B., and F. Yu, Anomalously large difference in dipole moment of isomers with nearly identical thermodynamic stability, *J. Phys. Chem. A, 112* (31), 7222–7226, 2008
12. Du, H., A. B. Nadykto, and F. Yu, Quantum-mechanical solution to fundamental problems of classical theory of homogeneous water vapor nucleation, *Phys. Rev. E*, revised, 2008.
13. Nadykto, A. B., and F. Yu, Current trends in thermochemistry of nucleating clusters, in *Thermochemistry : New Research*, Nova Science Publishers, NY, in press, 2008.
14. Nadykto, A. B., F. Yu, and J. Herb, Theoretical analysis of the gas-phase hydration of common atmospheric pre-nucleation $(HSO_4^-)(H_2O)_n$ and $(H_3O^+)(H_2SO_4)(H_2O)_n$ cluster ions, Chemical Physics, revised, 2008.
15. Nadykto, A. B., H. Du, and F. Yu, Quantum DFT and DF-DFT study of infrared spectra of sulfuric acid, sulfuric acid monohydrate, formic acid and its cyclic dimer, *Vibrational Spectroscopy*, doi:10.1016/j.vibspec.2007.01.002, 2007.

16. Nadykto A.B., and F. Yu, Simple correction to the classical theory of homogeneous nucleation, *J. Chem. Phys., 122*, 104511 , 2005.
17. Nadykto, A.B. and F. Yu, Formation of binary ion clusters from polar vapours: effect of the dipole-charge interaction, *Atmos. Chem. Phys.* 4 (2), 385-389, 2004
18. Al Natsheh, A., A.B. Nadykto, F.Yu, K.V. Mikkelsen and J. Ruuskanen, Sulfuric acid and sulfuric acid hydrates in the gas phase: A DFT investigation, *J. Phys. Chem. A. 108*(41*)*, 8914-8929, 2004.
19. Nadykto, A. B., A. Al Natsheh, F.Yu., K.V. Mikkelsen and J. Ruuskanen. Effect of molecular structure and hydration on the uptake of gas-phase sulfuric acid by charged clusters/ultrafine particles, *Aerosol Sci. Techn.* 38(4), 349-353, 2004.
20. Nadykto A.B. and F. Yu, Uptake of neutral polar vapour molecules by charged particles: Enhancement due to dipole-charge interaction, *J. Geophys. Res.*, 108(D23), 4717, doi:10.1029/2003JD003664, 2003.
21. Nadykto, A.B., E.R.. Shchukin, M. Kulmala, K.E.J. Lehtinen and A. Laaksonen, Evaporation and condensational growth of liquid droplets in nonisothermal gas mixtures, *Aerosol Sci. Tech.* 37, 315-324, 2003.
22. Nadykto, A.B. Phase transitions in aerodisperse systems: Transitional condensational growth of non-spherical particles and mobility of ions. In *Mathematical Modeling: Problems, Methods, Applications*, Kluwer Academic/Plenum Publishers, New York, 345-354, 2002.
23. Nadykto A.B. *Condensational growth and evaporation of liquid droplets and ice particles in non-isothermal gas mixtures*. Report Series in *Aerosol Science*, 53, 1-65, 2001 (monograph)
24. Nadykto A.B., E.R. Schukin and L.A.Uvarova, Vaporization and growth of aerosol particles, given internal heat release and radiant heat exchange. In *Mathematical Models of Non-linear Excitations, Dynamics, Transfer and Control in Condensed Systems and Other Media*, Kluwer Academic/Plenum Publishers, New York., 321-334, 1999
25. Schukin E.R. and A.B.Nadykto Diffusive vaporization and growth of assembly of N-large particles. In *Mathematical Models of Non-Linear Excitations, Dynamics, Transfer and Control in Condensed Systems and Other Media*, Kluwer Academic/Plenum Publishers, New York, 351-364, 1999.
26. Schukin E.R. and A.B.Nadykto. Convective (Stefan) vaporaization of large and moderately large particles. In Book *Mathematical Models of Non-Linear Excitations, Dynamics, Transfer and Control in Condensed Systems and Other Media*, Kluwer Academic/Plenum Publishers, New York, 335-350, 1999.
27. Nadykto A.B. and E.R. Schukin. Kinetics of free diffusive vaporization and growth of large aerosol particles. *VANT, Theoretical and Applied Physics*, 1, 39-43, 1998
28. Schukin E.R., A.B.Nadykto and Zagayanov V.A. Kinetics of the vaporization and growth of the aerosol particles in the field of internal heat sources in the continuum regime. *VANT, Theoretical and Applied Physics*, 3, 43-52, 1998
29. Schukin E.R. and A.B.Nadykto. The effect of the Stefan flux on the evaporation and condensation of the aerosol particles at high temperature gradients in the aerodisperse system. *VANT, Theoretical and Applied Physics*, 2, 57-64, 1998
30. Schukin E.R., A.B.Nadykto and Schulinamova Z.L. Heterogeneous combustion of solid particles in a multicomponent gas mixture at low concentration of chemically active components. *VANT, Theoretical and Applied Physics*, 2, 26-30, 1997

Other Journal Publications and Book Chapters

31. Nadykto, A., and F. Yu, Thermochemistry of (H2SO4)m(H2O)n(NH3)k: A DFT study, in *Nucleation and Atmospheric Aerosols*, C. D. O'Dowd and P. E. Wagner (eds.), 297-301, Springer 2007.
32. Nadykto, A., and F. Yu, Stabilization of H2SO4-H2O Clusters by Organic Acids, in *Nucleation and Atmospheric Aerosols*, C. D. O'Dowd and P. E. Wagner (eds.), 321-325, Springer 2007.
33. Du., H., A. Nadykto, and F. Yu, Water Homogeneous Nucleation: Model with Quantum-Based Importance of Clustering Thermodynamics, in *Nucleation and Atmospheric Aerosols*, C. D. O'Dowd and P. E. Wagner (eds.), 167-171, Springer 2007.

34. Nadykto, A. B., Yu, F., Uptake of polar vapor molecules by charged ultrafine particles, *J. Aerosol Sci.*, 34 (S2), S995-996, 2003.
35. Nadykto, A.B., E.R.Schukin, M.Kulmala and A.Laaksonen. Analytical model of condensation growth of a multicomponent non-spherical particle. *J. Aerosol Sci. S32. S763-764*, 2001.
36. Nadykto, A.B., E.R.Schukin, M.Kulmala and A.Laaksonen. On evaporation and condensational growth of a non-spherical particles. *J.Aerosol Sci. S31. 2000.*
37. Nadykto, A.B., E.R.Schukin, M.Kulmala and A.Laaksonen. Evaporation and condensation rates for a multicomponent droplet in a non-isothermal gas mixture. *J. Aerosol Sci.. S3.*, 2000.

Conference Abstracts and Proceedings

More than 40 conference publications.