

DMITRY V. MATYUSHOV
CURRICULUM VITAE

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EDUCATION

Ph. D., 1989 *Theoretical and Mathematical Physics*, Kiev State University and
National Ukrainian Academy of Sciences, Kiev, Ukraine
(under Profs. A. V. Gorodyskii and A. I. Karasevskii)
M. S., 1986 *Chemical Physics*, National Ukrainian Academy of Sciences,
Kiev, Ukraine (under Prof. K. B. Yatsimirskii)
B. S., 1985 *Chemical Physics*, Moscow Institute for Physics and Technology,
Moscow, Russia.

EMPLOYMENT

1989–1993 Senior Research Fellow, Inst. of General and Inorganic Chemistry,
Ukrainian National Academy of Sciences, Kiev, Ukraine
1993–1994 Lise-Meitner Postdoctoral Fellow, Austrian Science Foundation
1995–1996 Visiting Professor at the Vienna Technical University,
Vienna, Austria
1996–1998 Postdoctoral Research Associate, Colorado State University,
Fort Collins
1998–2000 Research Associate, University of Utah, Salt Lake City
2000–2006 Assistant Professor, Department of Chemistry and Biochemistry,
Arizona State University.
2006–present Associate Professor, Department of Chemistry and Biochemistry,
Department of Physics and Astronomy, Arizona State University.

RESEARCH AND TEACHING INTERESTS

Research: Electron transfer, spectroscopy, solvation,
liquid-state theory, phase transitions
Teaching: Physical Chemistry, Quantum Chemistry, General Chemistry,
Statistical Mechanics.

AWARDS AND FELLOWSHIPS

1993 Scientific Award by the International Science Foundation
1993-1995 Lise Meitner Fellow by the Austrian Science Foundation
2000-2001 PRF G Start-up Grant
2002-2004 Research Innovation Award by the Research Corporation

COURSES TAUGHT**Arizona State University**

Fall 2000:	CHM 101, Introductory Chemistry. Evaluation: 3.65
Spring 2001:	Excused
Fall 2001:	CHM 341, Elementary Physical Chemistry. Evaluation: 4.41
Spring 2002:	CHM 546, Quantum Chemistry II
Fall 2002:	CHM 341, Elementary Physical Chemistry. Evaluation: 4.29
Spring 2003:	CHM 545, Quantum Chemistry I
Fall 2003:	CHM 598, Quantum Chemistry II
Spring 2004:	CHM 545, Quantum Chemistry I
Fall 2004:	Excused
Spring 2005:	CHM 545, Quantum Chemistry I
Fall 2005:	CHM 543, Computational Chemistry
Spring 2006:	CHM 545, Quantum Chemistry I
Fall 2006:	Sabbatical leave
Spring 2007:	CHM545

MENTORING

Graduate	Shikha Gupta, MS, "Effect of solute and solvent polarizability on electron transfer reactions", 2004. Anatoli Milischuk, PhD, "Theory and Computer Simulations of Equilibrium Polar Solvation with Applications to Electron Transfer in Organic Molecules", 2005. David LeBard, PhD Candidate Daniel Martin, PhD Candidate Allan Friesen, PhD Candidate (jointly with C. A. Angell)
Undergraduate	David LeBard, 2002–2004.
Postdoctoral	Mark Lilichenko, (2001-2003) Andriy Okhrimovskyy, (2004) Pradip Ghorai, (2005) Vitaliy Kapko, (2005-2007) Anatoli Milischuk (2006) Chun-Ming Chang, (2004-2005)

EXTERNAL FUNDING

- “Band-shape analysis of optical spectra in liquid solvents”, PRF-G, 01/01/2001–08/31/2003, \$25,000.
- “Anisotropic polarization and control of electron transfer rates”, Research Innovation Award by Research Corporation, 12/01/01–12/01/03, \$35,000.
- “Nanoscale charge transport in DNA”, Northwestern University sub-contract, 11/16/02–5/15/03, \$12,000.
- “Activation parameters of electron transfer in large molecules dissolved in molecular solvents”, PRF AC grant, 07/01/03–08/31/05, \$80,000.
- “Control of electron transfer in liquid crystalline solvents”, NSF, 08/01/03–07/31/06, \$294,000.
- “Solvation and Electron Transfer in Glassy and Anisotropic Media”, NSF, 08/01/06–07/31/09, \$360,000.
- “ Nanodielectrics For High Power Capacitors And Passive Applications”, Air Force, STTR, subcontract with Synkera Technologies, 08/01/06–07/31/07, \$30,000.
- “Dynamical Arrest, Structural Disorder, and Optimization of Organic Photovoltaic Devices”, DOE, 08/01/07–07/31/10, \$420,000, co-PI with I. R. Gould.

LIST OF PUBLICATIONS AND PRESENTATIONS

1. A. I. Karasevskii, D. V. Matyushov, and A. V. Gorodiskii, *Radiationless transitions in systems with movable defects and proceeding of redox reactions*, Dokl. Acad. Sci. USSR **297** (1987) pp. 1156-1158.
2. D. V. Matyushov and Y. A. Maletin, *Electron transfer accompanied by bond rupture*, Chem. Phys. **127** (1988) pp. 325-334.
3. A. I. Karasevskii, D. V. Matyushov, and A. V. Gorodyskii, *Electron transfer in media with local fluctuations*, Chem. Phys. **142** (1990) pp. 1-15.
4. A. V. Gorodyskii, A. I. Karasevskii, and D. V. Matyushov, *Adiabatic outer sphere electron transfer through the metal-electrolyte interface*, J. Electroanal. Chem. **315** (1991) pp. 9-28.
5. D. V. Matyushov, *Electron transfer induced by liquid defect motion. Exact solution*, Chem. Phys. **155** (1991) pp. 331-344.
6. D. V. Matyushov, *Donor-acceptor vibrations in nonadiabatic electron transfer reactions*, Chem. Phys. **164** (1992) pp. 31-46.
7. D. V. Matyushov, *Electron transfer in molecules with conformational transitions*, Chem. Phys. Lett. **203** (1993) pp. 131-136.
8. A. V. Gorodyskii, A. I. Karasevskii, and D. V. Matyushov, *Electrochemical impedance under nonequilibrium electrode polarization*, Electrochim. Acta **38** (1993) pp. 1671-1678.
9. D. V. Matyushov, *A molecular theory of electron transfer reactions in polar liquids*, Mol. Phys. **79** (1993) pp. 795-808.
10. D. V. Matyushov, *Reorganization energy of electron transfer in polar liquids. Dependence on reactant size, temperature and pressure*, Chem. Phys. **174** (1993) pp. 199-218.
11. D. V. Matyushov, *Potential-step transient response of an electrochemical system*, J. Electroanal. Chem. **367** (1994) pp. 1-6.
12. D. V. Matyushov and R. Schmid, *Stationary points in the temperature dependence of electron transfer rates*, Chem. Phys. Lett. **220** (1994) pp. 359-364.
13. D. V. Matyushov and R. Schmid, *A molecular treatment of solvent effects on intervalence electron transfer*, J. Phys. Chem. **98** (1994) pp. 5152-5159.
14. D. V. Matyushov and R. Schmid, *Properties of Liquids at the Boiling Point: Equation of State, Internal Pressure and Vaporization Entropy*, Ber. Bunsenges. Phys. Chem. **98** (1994) pp. 1590-1595.
15. D. V. Matyushov and R. Schmid, *Liquid molecularity: the effect of solvent on chemical reactivity*, Current Topics in Solution Chemistry, review, Research Trends, 1994.
16. R. Schmid and D. V. Matyushov, *Entropy of Attractive Interactions in Liquids at 298 K: A Measure of Structural Ordering*, J. Phys. Chem. **99** (1995) pp. 2893-2402.

¹Graduate students are underlined, postdocs are listed in bold

17. D. V. Matyushov and R. Schmid, *Charge separation/recombination reactions in nonpolar fluids: a molecular description*, Mol. Phys. **84** (1995) pp. 533-552.
18. D. V. Matyushov and R. Schmid, *Optical and radiationless intramolecular electron transitions in nonpolar fluids: Relative effects of induction and dispersion interactions*, J. Chem. Phys. **103** (1995) pp. 2034-2049.
19. D. V. Matyushov and R. Schmid, *Calculation of Lennard-Jones energies of molecular fluids*, J. Chem. Phys. **104** (1996) pp. 8627-8638.
20. D. V. Matyushov and R. Schmid, *A thermodynamic analysis of solvation in dipolar liquids*, J. Chem. Phys. **105** (1996) pp. 4729-4741.
21. D. V. Matyushov, *Solvent reorganization energy of electron transfer in weakly polar solvents*, Chem. Phys. **211** (1996) pp. 47-71.
22. D. V. Matyushov, R. Schmid, and B. M. Ladanyi, *A thermodynamic analysis of the π^* and $E_T(30)$ polarity scales*, J. Phys. Chem. **101** (1997) pp. 1035-1050.
23. D. V. Matyushov and B. M. Ladanyi, *Nonlinear effects in dipole solvation: I. Thermodynamics*, J. Chem. Phys. **107** (1997) pp. 1362-1374.
24. D. V. Matyushov and B. M. Ladanyi, *Nonlinear effects in dipole solvation: II. Optical spectra and electron transfer activation*, J. Chem. Phys. **107** (1997) pp. 1375-1387.
25. D. V. Matyushov and B. M. Ladanyi, *Cavity Formation Energy in Hard Sphere Fluids: An Asymptotically Correct Expression*, J. Chem. Phys. **107** (1997) pp. 5815-5820.
26. D. V. Matyushov and B. M. Ladanyi, *Dispersion Solute-Solvent Coupling in Electron Transfer Reactions: I. Effective Potential*, J. Chem. Phys. **108** (1998) pp. 6362-6377.
27. D. V. Matyushov and B. M. Ladanyi, *Spontaneous emission and electron transfer rates in condensed phases*, J. Phys. Chem. **102** (1998) pp. 5027-5039.
28. C. M. Elliott, D. Derr, D. V. Matyushov, and M. D. Newton, *A Direct Experimental Comparison of the Electron Transfer Theories of Marcus and Hush Employing a Mixed-Valence Dinuclear Iron Polypyridyl*, J. Am. Chem. Soc. **120** (1998) pp. 11714-11726.
29. D. V. Matyushov and B. M. Ladanyi, *A perturbation theory and simulations of the dipole solvation thermodynamics. Dipolar hard spheres*, J. Chem. Phys. **110** (1999) pp. 994-1009.
30. D. V. Matyushov and G. A. Voth, *A perturbation theory and simulations of dipole solvation thermodynamics: Dipolar-quadrupolar liquids*, J. Chem. Phys. **111** (1999) pp. 3630-3638.
31. D. V. Matyushov, D. Henderson, and K.-Y. Chan, *The solvent-solute distribution function of binary hard sphere mixtures for dilute concentrations of the large sphere*, Mol. Phys. **96** (1999) pp. 1813-1816.
32. P. Vath, M. B. Zimmt, D. V. Matyushov, and G. A. Voth, *A failure of continuum theory: Temperature dependence of the solvent reorganization energy in highly polar solvents*, J. Phys. Chem. **103** (1999) pp. 9130-9140.

33. D. V. Matyushov and G. A. Voth, *A theory of electron transfer and steady-state optical spectra of chromophores with varying electronic polarizability*, J. Phys. Chem. **103** (1999) pp. 10981-10992.
34. D. V. Matyushov and G. A. Voth, *Reorganization parameters of electronic transition in electronically delocalized systems. I. Electron transfer reactions*, J. Phys. Chem. **104** (2000) pp. 6470-6484.
35. D. V. Matyushov and G. A. Voth, *Reorganization parameters of electronic transition in electronically delocalized systems. II. Optical spectra*, J. Phys. Chem. **104** (2000) pp. 6485-6494.
36. D. V. Matyushov and G. A. Voth, *Modeling the free energy surfaces of electron transfer in condensed phases*, J. Chem. Phys. **113** (2000) pp. 5413-5424.
37. D. V. Matyushov and M. D. Newton, *Understanding the Optical Band-Shape: Steady-State Coumarin-153 Spectroscopy*, J. Phys. Chem. A **105** (2001) pp. 8516-8532 (17 pages).
38. D. V. Matyushov, *Time-resolved fluorescence of polarizable chromophores*, J. Chem. Phys. **115** (2001) pp. 8933-8941 (9 pages).
39. A. Milischuk and D. V. Matyushov, *Dipole Solvation: Nonlinear Effects, Density Reorganization, and the Breakdown of the Onsager Saturation Limit*, J. Phys. Chem. A (invited) **106** (2002) pp. 2146-2157 (12 pages).
40. D. Small, D. V. Matyushov, and G. A. Voth, *The theory of electron transfer reactions: What may be missing?*, J. Am. Chem. Soc. **125** (2003) pp. 7470-7478 (8 pages).
41. A. Milischuk and D. V. Matyushov, *On the validity of dielectric continuum models in application to solvation in molecular solvents*, J. Chem. Phys. **118**, (2003) pp. 1859-1862 (4 pages).
42. A. Milischuk and D. V. Matyushov, *Non-Condon theory of electron transfer in V-shaped donor-bridge-acceptor complexes*, J. Chem. Phys. **118** (2003) pp. 5596-5606 (11 pages).
43. **M. Lilichenko** and D. V. Matyushov, *Control of electron transfer rates in liquid crystalline media*, J. Phys. Chem. B **107** (2003) pp. 1937-1940 (letter, 4 pages).
44. **M. Lilichenko** and D. V. Matyushov, *Reorganization energy of intermolecular electron transfer in solvents near isotropic/nematic transition*, J. Chem. Phys. **119** (2003) pp. 1559-1568 (10 pages).
45. D. N. LeBard, **M. Lilichenko**, D. V. Matyushov, Y. A. Berlin, M. A. Ratner, *Solvent reorganization energy of charge transfer in DNA hairpins*, J. Phys. Chem. B **107** (2003) pp. 14509-14520 (12 pages).
46. S. Gupta and D. V. Matyushov, *Effects of solute and solvent polarizability on the solvent reorganization energy of electron transfer reactions*, J. Phys. Chem. A **108** (2004) pp. 2087-2096 (10 pages).
47. D. V. Matyushov, *Dipole solvation in dielectrics*, J. Chem. Phys. **120** (2004) pp. 1375-1382 (8 pages).
48. D. V. Matyushov, *Solvent reorganization energy of electron transfer reactions in polar solvents*, J. Chem. Phys. **120** (2004) pp. 7532-7556 (25 pages).

49. D. V. Matyushov, *On the microscopic theory of polar solvation dynamics*, J. Chem. Phys. **122** (2005) 044502 (11 pages).
50. D. V. Matyushov, *A phenomenological model of dynamical arrest of electron transfer in solvents in the glass-transition region*, J. Chem. Phys. **122** (2005) 084507 (11 pages).
51. D. V. Matyushov and **A. Okhrimovskyy**, *Paraelectric and ferroelectric order in two-state dipolar fluids*, J. Chem. Phys. **122** (2005) 191101 (communication, 4 pages).
52. D. V. Matyushov and C. A. Angell, *Two-Gaussian excitations model for the glass transition*, J. Chem. Phys. **123** (2005) 034506 (12 pages).
53. A. Milischuk and D. V. Matyushov, *Equilibrium solvation in quadrupolar solvents*, J. Chem. Phys. **123** (2005) 044501 (20 pages).
54. **P. K. Ghorai** and D. V. Matyushov, *Dynamical arrest of electron transfer in viscous solvents*, J. Am. Chem. Soc. **127**, (2005) 16390-16391 (communication, 2 pages).
55. **P. K. Ghorai** and D. V. Matyushov, *Reorganization energy of electron transfer in viscous solvents above the glass transition*, J. Phys. Chem. B **110**, (2006) 1866-1871.
56. **P. K. Ghorai** and D. V. Matyushov, *Solvent reorganization of electron transfer in viscous solvents*, J. Chem. Phys. **124** (2006) No. 144510 (18 pages).
57. **V. Kapko** and D. V. Matyushov, *Theory of solvation in polar nematics*, J. Chem. Phys. **124** (2006) No. 114904 (13 pages).
58. A. A. Milischuk, D. V. Matyushov and M. D. Newton, *Activation entropy of electron transfer reactions*, Chem. Phys. (invited) **324** (2006) pp. 172-194.
59. **P. K. Ghorai** and D. V. Matyushov, *Reorganization entropy of electron transfer in polar solvents*, J. Phys. Chem. A **110** (2006) pp. 8857-8863.
60. D. V. Matyushov, *Reorganization asymmetry of electron transfer in ferroelectric materials and principles of artificial photosynthesis*, J. Phys. Chem. B **110** (2006) pp. 10095-10104.
61. **V. Kapko** and D. V. Matyushov, *Dynamical arrest of electron transfer in liquid crystalline solvents*, J. Phys. Chem. B **110** (2006) pp. 13184-13194.
62. **A. A. Milischuk** and D. V. Matyushov, *Quadrupolar solvatochromism: 4-amino-phthalimide in toluene*, J. Chem. Phys. **124** (2006) No. 204502 (6 pages).
63. Naoki Ito, Kalyan Duvvuri, D. V. Matyushov, and R. Richert, *Solvent response and dielectric relaxation in supercooled butyronitrile*, J. Chem. Phys. **125** (2006) No. 024504 (8 pages).
64. D. V. Matyushov and C. A. Angell *Gaussian excitations model of glass-former dynamics and thermodynamics*, J. Chem. Phys. **126** (2007) No. 094501.
65. D. V. Matyushov, *Energetics of electron transfer in soft condensed media*, Acc. Chem. Res. **40** (2007) pp. 294-301.
66. D. V. Matyushov, *Model energy landscapes of low-temperature fluids: Dipolar hard spheres*, Phys. Rev. E **76** (2007) No. 011511 (7 pages).

67. D. V. Matyushov, *Dielectric response of one-dimensional polar chains*, J. Chem. Phys. 127 (2007) No. 054702.
68. D. N. LeBard and D. V. Matyushov, *Glassy protein dynamics and gigantic reorganization energy of plastocyanin*, J. Phys. Chem. B, in press.
69. D. R. Martin and D. V. Matyushov, *Cavity field in liquid dielectrics*, Europhys. Lett., in press.
70. **V. Kapko**, D. V. Matyushov, and C. A. Angell, *Thermodynamics and dynamics of a monoatomic glass-former. Constant pressure and constant volume behavior*, J. Chem. Phys., in press.
71. D. N. LeBard and D. V. Matyushov, *Redox entropy of plastocyanin: Developing a microscopic view of mesoscopic solvation*, J. Chem. Phys., submitted.
72. D. N. LeBard, **V. Kapko**, and D. V. Matyushov, *Energetics and kinetics of primary charge separation in bacterial photosynthesis*, J. Phys. Chem. B, submitted.
73. D. V. Matyushov, *Non-Gaussian statistics of binding/unbinding events and the energetics of electron transfer reactions*, Chem. Phys., submitted.

REVIEWS AND BOOK CHAPTERS (NON-REFEREED)

74. D. V. Matyushov and G. A. Voth, *New Developments in the Theoretical Description of Charge-Transfer Reactions in Condensed Phases*, Rev. Comp. Chem. V.18 (2002), K. B. Lipkowitz and D. B. Boyd eds., Wiley-VCH, pp. 147-210.
75. D. V. Matyushov, *Electron transfer reactions: Theory*, Encyclopedia of Inorganic Chemistry, 2nd Edition, Wiley, 2005.

INVITED TALKS

Nonequilibrium Phenomena, Nonadiabatic Dynamics and Spectroscopy, Telluride, 2007.
Electron donor-acceptor interactions, Gordon Research Conference, 2006.
Workshop on Dynamics in Condensed Phases, Telluride, 2006.
South-West ACS Meeting, Houston, 2006.
Thermodynamics of electron transfer reactions, ACS National Meeting, Washington, DC, 2005.
Controlling electron transfer in molecules, University of Washington, 2005.
Electron transfer, optical spectroscopy, and solvation in polar liquids, MIT, 2004.
Polar solvation: Born vs Onsager picture, Carnegie Mellon University, 2004.
Solute polarizability in electron transfer reactions, University of Pittsburgh, 2004.
Workshop on Dynamics in Condensed Phases, Telluride, 2004.
University of Missouri Columbia, March 2004.
ACS National Meeting, New Orleans, 2003.
Workshop on Dynamics in Condensed Phases, Telluride, 2002.
Workshop on Dynamics in Condensed Phases, Telluride, 2000.
Arizona State University, Tempe, February 2000.
Rice University, Houston, March 2000.
Wayne State University, Detroit, December 1999.
Gordon Research Conferences: Electron Donor Acceptor Interactions, 1998.
Workshop on Electron Transfer Reactions, Munich 1995.
Technical University of Munich, 1994.

5th International Congress of Quantum Chemistry, Sophia Antipolis 1991.