Vita

Matt K. Petersen, Ph.D.

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Education

2006: Ph.D. Physical Chemistry, University of Utah
Proton transport and solvation in complex environments. Gregory A. Voth, Chair
2000: B.S. Mathematics, Physics minor, University of Idaho
1998: B.S. Professional Chemistry, University of Idaho

Recent Positions

2009-current: Post-Doctoral Fellow,
Department of Chemistry and Center for Biophysical Modeling and Simulation, University of Utah

2007-2009: Post-Doctoral Fellow,
Center for Integrated Nano Technologies, Sandia National Labs

Select Publications

Petersen, Matt K.; Hatt, Alison J.; Voth, Gregory A. **Orientational Dynamics of Water in the Nafion Polymer Electrolyte Membrane and Its Relationship to Proton Transport.** Journal of Physical Chemistry B (2008), 112(26),7754-7761.

Petersen, Matt K.; Voth, Gregory A. **Characterization of the Solvation and Transport of the Hydrated Proton in the Perfluorosulfonic Acid Membrane Nafion.** Journal of Physical Chemistry B (2006), 110(37),18594-18600.

Petersen, Matt K.; Voth, Gregory A. **Amphiphilic Character of the Hydrated Proton in Methanol-Water Solutions.** Journal of Physical Chemistry B (2006), 110(14), 7085-7089.

Petersen, Matt K.; Wang, Feng; Blake, Nick P.; Metiu, Horia; Voth, Gregory A. **Excess Proton Solvation and Delocalization in a Hydrophilic Pocket of the Proton Conducting Polymer Membrane Nafion.** Journal of Physical Chemistry B (2005), 109(9), 3727-3730.

Lapid, Hadas; Agmon, Noam; Petersen, Matt K; Voth, Gregory A. **A bond-order analysis of the mechanism for hydrated proton mobility in liquid water**. Journal of Chemical Physics (2005), 122(1), 14506.

Petersen, Matt K.; Iyengar, Srinivasan S.; Day, Tyler J. F.; Voth, Gregory A. **The Hydrated Proton at the Water Liquid/Vapor Interface.** Journal of Physical Chemistry B (2004), 108(39), 14804-14806.

Relevant Skills

Methods
Molecular Dynamics, Non-equilibrium Molecular Dynamics, Monte Carlo, Extended Ensemble MC (i.e. parallel tempering), Electronic Structure, QM/MM, experienced with force-field development and method development/implementation.

Codes
LAMMPS (C++ MD simulator), DL POLY (Fortran MD simulator), DL EVB and SCI DL EVB (Fortan/C reactive potential MD simulator), Gaussian/Gauss View, VMD (analysis/ molecular visualization).

Programming
Experienced with Fortran, C++, MPI, Linux/UNIX shell scripting.

OS/Computers
Experienced with Linux/UNIX, BSD/OSX, Windows. Familiar with various message passing implementations, i.e. Open MPI, MPICH, MVAPICH, SGI-MPT. Experienced with PBS and LSF batch scripting.

Leadership/Teamwork
As a graduate student I led a portion of my advisor's group focusing on topics in proton transport. This six-ten member group considered problems ranging from enzymatic catalysis and transmembrane proton transport to proton conduction in polyelectrolyte membranes.

Research Positions

2009-current: Post-Doctoral Fellow,
Department of Chemistry and Center for Biophysical Modeling and Simulation, University of Utah

2007-2009:Post-Doctoral Fellow,
Center for Integrated Nano Technologies, Sandia National Labs

2006: Post-Doctoral Fellow,
Department of Chemistry and Center for Biophysical Modeling and Simulation, University of Utah

2004-2006: Research Assistant,
Department of Chemistry and Center for Biophysical Modeling and Simulation, University of Utah

2002-2004: Research Assistant,
Department of Chemistry and Henry Eyring Center for Theoretical Chemistry,
University of Utah

2001: Henry Eyring Fellow,
Henry Eyring Center for Theoretical Chemistry, University of Utah

1999-2000: Research Assistant,
Ecological and Conservation Genetics Laboratory, University of Idaho

1999: Research Assistant,
Hyperfine Interactions Laboratory, Washington State University

1998: Research Assistant,
Resonance Raman spectroscopy for the study of electron transfer, University of Idaho

Recent Talks

Invited
Shear Rheology Through Computer Simulation.
Corning Incorporated; Corning, New York (8/2008)

Improving Proton Transport Membranes: Lessons From Molecular Dynamics.
Eastern Washington University; Cheney, Washington (3/2007)

Explicit Proton Transport and Solvation in Simple Fluids and Hydrated Nafion.
Center for Integrated Nano Technology, Sandia National Laboratories-New Mexico; Albuquerque, New Mexico (1/2007)

Conference
Stochastic Rotational Dynamics of Simulations of Nanocolloid Suspensions.
APS March 2009; Pittsburgh, Pennsylvania (3/2009)

Shear Thinning in Nanoparticle Suspensions.
APS March 2008; New Orleans, Louisiana (3/2008)

Effect of Nanoparticle Shape and Size on Shear Rheology.
APS March 2008; New Orleans, Louisiana (3/2008)

Proton Transport Coupling to Solvent Rearrangements in the Perfluorosulfonic Acid Membrane Nafion.
ECS spring 2007; Chicago, Illinois (5/2007)

Characterization of the Solvation and Transport of the Hydrated Proton in the Perfluorosulfonic Acid Membrane Nafion.
AIChE 2006 Annual Meeting; San Fransisco, California (11/2006)

Teaching Positions

2001-2002: Teaching Assistant,
Department of Chemistry, University of Utah

1997-1999: Teaching Assistant,
Department of Chemistry, University of Idaho

Professional Memberships

The American Physical Society
The Electrochemical Society
American Institute of Chemical Engineers

Awards/Fellowships

Henry Eyring Fellowship,
Henry Eyring Center for Theoretical Chemistry, University of Utah

Certifications/Clearance

Department of Energy - L Security Clearance
Department of Defense - Position of Public Trust

All Publications

in 't Veld, Pieter; Petersen, M. K.; Grest, G.S. **Shear Thinning of Nanoparticle Suspensions.** Physical Review E (2009), 79(2), 021401.

Brown, W. M.; Petersen, M. K.; Plimpton, S. J.; Grest, G.S. **Liquid Crystal Nanodroplets in Solution.** Journal of Chemical Physics (2009), 130(4), 044901.

Petersen, Matt K.; Hatt, Alison J.; Voth, Gregory A. **Orientational Dynamics of Water in the Nafion Polymer Electrolyte Membrane and Its Relationship to Proton Transport.** Journal of Physical Chemistry B (2008), 112(26),7754-7761.

Swanson, Jessica M. J.; Maupin, C. Mark; Chen, Hanning; Petersen, Matt K.; Xu, Jiancong.; Wu, Yujie.; Voth, Gregory A. **Proton Solvation and Transport in Aqueous and Biomolecular Systems: Insights from Computer Simulations.** Journal of Physical Chemistry B (2007), 111(17), 4300-4314 (feature article).

Petersen, Matt K.; Voth, Gregory A. **Characterization of the Solvation and Transport of the Hydrated Proton in the Perfluorosulfonic Acid Membrane Nafion.** Journal of Physical Chemistry B (2006), 110(37), 18594-18600.

Petersen, Matt K.; Voth, Gregory A. **Amphiphilic Character of the Hydrated Proton in Methanol-Water Solutions.** Journal of Physical Chemistry B (2006), 110(14), 7085-7089.

Burnham, Christian J.; Petersen, Matt K.; Day, Tyler J. F.; Iyengar, Srinivasan S.; Voth, Gregory A. **The properties of ion-water clusters. II. Solvation structures of Na+, Cl-, and H+ clusters as a function of temperature.** Journal of Chemical Physics (2006), 124(2), 024327

Petersen, Matt K.; Wang, Feng; Blake, Nick P.; Metiu, Horia; Voth, Gregory A. **Excess Proton Solvation and Delocalization in a Hydrophilic Pocket of the Proton Conducting Polymer Membrane Nafion.** Journal of Physical Chemistry B (2005), 109(9), 3727-3730.

Lapid, Hadas; Agmon, Noam; Petersen, Matt K; Voth, Gregory A. **A bond-order analysis of the mechanism for hydrated proton mobility in liquid water**. Journal of Chemical Physics (2005), 122(1), 14506.

Iyengar, Srinivasan S; Petersen, Matt K; Day, Tyler J F; Burnham, Christian J; Teige, Virginia E; Voth, Gregory A. **The properties of ion-water clusters. I. The protonated 21-water cluster**. Journal of Chemical Physics (2005), 123(8), 084309.

Blake, Nick P.; Petersen, Matt K.; Voth, Gregory A.; Metiu, Horia. **Structure of Hydrated Na-Nafion Polymer Membranes.** Journal of Physical Chemistry B (2005), 109(51), 24244-24253.

Petersen, Matt K.; Iyengar, Srinivasan S.; Day, Tyler J. F.; Voth, Gregory A. **The Hydrated Proton at the Water Liquid/Vapor Interface.** Journal of Physical Chemistry B (2004), 108(39), 14804-14806.

Iyengar, Srinivasan S.; Burnham, Christian J.; Petersen, Matt K.; Voth, Gregory A. **Modeling condensed-phase chemistry through molecular dynamics simulation.** Computing in Science & Engineering (2003), 5(4), 31-35.