

**Dwight R. Stoll, Ph.D.**  
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## Education

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- Assistant Professor** *Gustavus Adolphus College, September 2008 – present*
- Post-Doctoral Fellow** *Departments of Biochemistry, Molecular Biology, and Biophysics, and Medicine, University of Minnesota, October 2007 – July 2008*
- Doctor of Philosophy** *Analytical Chemistry, University of Minnesota, September, 2007*  
*Dissertation Title: Fast, Comprehensive Two-Dimensional High Performance Liquid Chromatography*  
*Advisor: Professor Peter W. Carr*
- Bachelor of Science** *Biochemistry, Minnesota State University, Mankato, 2001*
- Bachelor of Science** *Plant Biology, Minnesota State University, Mankato, 1999*

## Teaching Experiences

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- Instructor** *Analytical Chemistry with Laboratory, St. Olaf College, Fall 2005*  
*Introduction to Molecular Thermodynamics with Laboratory (Second semester of General Chemistry), St. Olaf College, Spring 2006*
- Teaching Assistant** *General Chemistry Laboratory, University of Minnesota, Spring 2004*  
*Instrumental Analysis Lecture, University of Minnesota, Fall 2003*  
*General Chemistry Laboratory, Minnesota State University, Mankato, Fall 1998*

## Related Professional Experience

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- Research Scientist** *ZirChrom Separations, Inc., Anoka, MN, October 2000 – July 2003*
- Developed novel zirconia-based materials for HPLC
  - Prepared and delivered numerous technical presentations at national and international conferences
  - Led technical support staff in developing written technical support documentation, and product field support
  - Prepared and delivered technical presentations to leading U.S. chromatography vendors and pharmaceutical companies
  - Developed numerous HPLC methods in response to customer needs
- Consultant** *Consultant to Systec, Inc., Fall 2004*  
*Consultant to Brown, Winick, Graves, Gross, Baskerville and Schoenebaum, Fall 2004*  
*Consultant to American Medical Systems, Spring 2007 - present*  
*Consultant to Nanocopoeia, Inc., July 2006 - present*

## Major Academic Honors and Awards

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**Best Presentation Award** 3<sup>rd</sup> Year Graduate Student Symposium, *University of Minnesota*, 2004  
**American Chemical Society Division of Analytical Chemistry Nine Month Fellowship**, 2006-2007  
**University of Minnesota Graduate School Dissertation Fellowship**, 2006-2007  
**Invited to contribute article to first *Editor's Choice Issue of the Journal of Chromatography***, Fall 2006  
**Camille and Henry Dreyfus Foundation Faculty Start-up Award**, Fall 2008  
**Phillips Award for Contributions to Multidimensional Gas Chromatography**, May 2009

## Publications

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1. Dunlap, C. J.; McNeff, C. V.; Stoll, D. R.; Carr, P. W. "Zirconia stationary phases for extreme separations." *Analytical Chemistry* **2001**, 73, 598A-607A.
2. Schellinger, A. P.; Stoll, D. R.; Carr, P. W. "High speed gradient elution reversed-phase liquid chromatography." *Journal of Chromatography A* **2005**, 1064, 143-156.
3. Stoll, D. R.; Carr, P. W. "Fast, Comprehensive Two-dimensional HPLC separation of tryptic peptides based on High-Temperature HPLC." *Journal of the American Chemical Society* **2005**, 127, 5034-5035.
4. Wang, X.; Stoll, D. R.; Schellinger, A. P.; Carr, P. W. "Peak capacity optimization of peptide separations in reversed-phase gradient elution chromatography: fixed column format." *Analytical Chemistry* **2006**, 78, 3406-3416.
5. Wang, X.; Stoll, D. R.; Carr, P. W.; Schoenmakers, P. J. "A graphical method for understanding the kinetics of peak capacity production in gradient elution liquid chromatography." *Journal of Chromatography A* **2006**, 1125, 177-181.
6. Stoll, D. R.; Cohen, J. D.; Carr, P. W. "Fast, comprehensive two-dimensional HPLC through the use of High Temperature Ultra-Fast Gradient Elution RPLC." *Journal of Chromatography A* **2006**, 1122, 123-137.
7. Porter, S. E. G.; Stoll, D. R.; Rutan, S. C.; Carr, P. W.; Cohen, J. D. "Analysis of four-way two-dimensional liquid chromatography – diode array data: Application to metabolomics." *Analytical Chemistry* **2006**, 78, 5559-5569.
8. Schellinger, A. P.; Stoll, D. R.; Carr, P. W. "High speed gradient elution RPLC of bases in buffered eluents Part II: Full equilibrium." *Journal of Chromatography, A* **2008**, 1192, 54-61.
9. Schellinger, A. P.; Stoll, D. R.; Carr, P. W. "High speed gradient elution RPLC of bases in buffered eluents Part I: Retention repeatability and column reequilibration." *Journal of Chromatography, A* **2008**, 1192, 43-51.
10. Stoll, D.R., C. Paek, and P.W. Carr. "Fast gradient elution reversed-phase HPLC with diode-array detection as a high throughput screening method for drugs of abuse. I: Chromatographic conditions." *Journal of Chromatography A*, **2006**, 1137, 153-162.

11. Porter, S. E. G.; Stoll, D. R.; Carr, P. W.; Rutan, S. C. "Fast gradient elution reversed-phase HPLC with diode-array detection as a high throughput screening method for drugs of abuse. II: Data analysis." *Journal of Chromatography A* **2006**, 1137, 163-172.
12. Stoll, D. R.; Li, X.; Wang, X.; Porter, S. E. G.; Rutan, S. C.; Carr, P. W. "High temperature, fast two-dimensional liquid chromatography." *Journal of Chromatography A*, **2007**, 1168, 3-43, doi:10.1016/j.chroma.2007.08.054.
13. McNeff, C., V.; Yan, B.; Stoll, D., R.; Henry, R. "Practice and theory of high temperature liquid chromatography." *Journal of Separation Science*, **2007**, 30, 1672-1685.
14. Davis, J. M.; Stoll, D., R.; Carr, P. W. "Effect of first dimension undersampling on effective peak capacity in comprehensive two-dimensional separations." *Analytical Chemistry* **2007**, 80, 461-473, doi: 10.1021/ac071504j.
15. Stoll, D., R.; Wang, X.; Carr, P. W. "A comparison of the practical resolving power of one- and two-dimensional High Performance Liquid Chromatography analysis of metabolomic samples." *Analytical Chemistry* **2007**, 80, 268-278, 10.1021/ac701676b.
16. Davis, J. M.; Stoll, D. R.; Carr, P.W. "Dependence of effective peak capacity in comprehensive two-dimensional separations on the distribution of peak capacity between the two dimensions." *Analytical Chemistry* **2008**, 80, 8122-8134, doi: 10.1021/ac800933z.
17. Reichenbach, S. E.; Carr, P. W.; Stoll, D. R.; Tao, Q. "Smart templates for peak pattern matching with comprehensive two-dimensional liquid chromatography." *Journal of Chromatography, A*, **2008**, 1216, 3458-3466, doi:10.1016/j.chroma.2008.09.058.
18. Li, X.; Stoll, D. R.; Carr, P. W. "A simple and accurate equation for peak capacity estimation in two dimensional liquid chromatography." *Analytical Chemistry*, **2008**, 81, 845-850, doi:10.1021/ac801772u.
19. Carr, P.W.; Wang, X.; Stoll, D.R. "Effect of Pressure, Particle Size, and Time on Optimizing Performance in Liquid Chromatography." *Analytical Chemistry*, **2009**, 81, 5342-5353, doi: 10.1021/ac9001244.
20. Stoll, D.R. "Guidelines for Bioanalytical 2D-Chromatography Method Development and Implementation. *Bioanalysis*," **2009**, In Press.

## Selected Recent Presentations

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1. Stoll, D. R.; McNeff, C. V.; Carr, P. W. "A Study of the Use of Unconventional Solvents As Mobile Phase Additives with a Carbon-Clad Zirconia Stationary Phase: Effects on Retention, Peak Shape, Plate Count and Selectivity for Steroidal Compounds." *HPLC2003*, Nice, France, 2003.
2. Schellinger, A. P.; Stoll, D. R.; Carr, P. W. "Accelerating Speed in Gradient Elution HPLC." *HPLC2004*, Philadelphia, PA, 2004.
3. Stoll, D. R.; Barkawi, L.; Cohen, J. D.; Carr, P. W. "Fast, Two-Dimensional High Performance Liquid Chromatography of Indolic Metabolites Found in Plants." *Metabolic Profiling*, Orlando, FL, 2004.
4. Schultze, M. A.; Stoll, D. R.; Carr, P. W. "Performance of Cation-Exchange Columns Used in Proteomics." *Pittcon*, Orlando, FL, 2005.

5. Carr, P. W.; Stoll, D. R. "Fast, Two-Dimensional High Performance Liquid Chromatography of Peptides." *Pittcon*, Orlando, FL, 2005.
6. Stoll, D. R.; Schellinger, A. P.; Wang, X.; Carr, P. W. "Fast, Two-Dimensional Gradient Elution High Performance Liquid Chromatography of Peptides." *ISPPP 2005*: St. Pete Beach, FL, 2005.
7. Stoll, D.; Wang, X.; Carr, P. W. "A critical look at peak capacity production in 2D high performance liquid chromatography." *ACS National Meeting*, San Francisco, CA, September, 2006.
8. Stoll, D.; Wang, X.; Carr, P. W. "A Simple Yet Accurate Approach to Optimization in Isocratic HPLC with a Focus on Performance, and Insights into the Roles of Temperature and Pressure in Fast Separations." *Minnesota Chromatography Forum Spring Symposium*, Minneapolis, MN, 2009.

## Invited Presentations

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1. Stoll, D. R.; Wang, X.; Thompson, J. D.; Carr, P. W. "Effects of Pressure and Temperature on Speed and Efficiency in HPLC." *HPLC2008*, Baltimore, MD, 2008.
2. Stoll, D. R.; Carr, P. W. "A Simple Yet Accurate Approach to Optimization in Isocratic HPLC with a Focus on Performance and Insights into the Roles of Temperature and Pressure in Fast Separations." *Pittsburgh Conference*, Chicago, IL, 2009.
3. Stoll, D. R.; Davis, J. M.; Carr, P. W. "Effects of first dimension undersampling and the distribution of peak capacity between separation dimensions on the effective peak capacity of comprehensive two-dimensional separations." *6<sup>th</sup> GC x GC Symposium*, Portland, OR, 2009.
4. Stoll, D. R.; Wang, X.; Li, X.; Potts, L. W.; Carr, P. W. "Fast, Comprehensive Two-Dimensional HPLC for the Analysis of Complex Mixtures - Optimizing the Second Dimension Separation." *ACS National Meeting*, Washington, D.C., 2009.

## U.S. Patents

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1. "High stability porous metal oxide spherules used for one-step antibody purifications", U.S. Patent No. 6,846,410 B2, (January 25, 2005).
2. "Chelator-modified inorganic oxide particles", U.S. Patent Pending (Application No. 2005037397, June 2, 2005).

## Current Research Interests / Expertise

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*Expertise:* Multidimensional separations, High Temperature HPLC, ultra-fast gradient elution HPLC, HPLC column packing, HPLC instrumentation, biological separations, LC/MS, forensic and toxicological analysis

*Interests:* My primary research interests are motivated by the need to develop novel analytical approaches necessitated by the tremendous complexity of biological and environmental samples (systems) which continue to challenge the state of the art of separation science. Multidimensional separations offer a staggering improvement in the amount of information which can be extracted from complex samples in a single analysis, compared to conventional one-dimensional HPLC methods. By applying the concepts of High Temperature HPLC, and investigating the limits of gradient elution HPLC, we improved the speed of two-dimensional HPLC by nearly an order of magnitude; separations

that once took tens of hours per analysis can now be completed in tens of minutes, while maintaining the tremendous information content of the two-dimensional technique.

My current interests in multidimensional separations are focused on the development of novel approaches for targeted analysis in biological and environmental matrices. In this context we aim to leverage the tremendous separation power of multidimensional methods to improve the speed, performance (as measured by precision and accuracy), and cost of methods geared toward the quantitation of one to roughly ten target analytes in a single analysis. In this work we also take advantage of the multidimensional characteristics of the datasets produced in multidimensional separations by applying chemometric methods to lower detection limits and improve quantitative accuracy and precision.

A quite different area of current interest is the development of high-throughput analytical methodologies for forensic and toxicological analysis, particularly the analysis of bio-fluids for drugs of abuse. In initial work on the development of gradient elution reversed-phase HPLC coupled detection by diode-array UV absorption spectroscopy, we dramatically improved the analysis time for a sample screening method from thirty minutes to just three minutes, without sacrificing the amount of information obtained in the analysis. Currently my interests in this area are focused on the implementation of novel column chemistries for HPLC for rapid confirmatory analyses of regulated intoxicants and their metabolites by HPLC coupled with tandem mass spectrometry.

## **Professional Memberships**

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American Chemical Society – Membership, 2003 – present

American Society for Mass Spectrometry – Membership, 2007-present

Minnesota Chromatography Forum – Membership, 2002 – present

## **Service Activities**

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Co-Chair, University of Minnesota Department of Chemistry Graduate Student Workshop Committee, 2004 – 2006

Institutional Infrastructure Advisory Committee, Natural Sciences and Mathematics Divisional Representative, 2008-present

## **Recreational Interests**

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Member of The Cantabile Singers, a chamber choral ensemble, 2004-2007

Running, cycling, and basketball (as a participant, not a spectator)

Reading about the history and learning of science

Outdoor activities including fishing, canoeing, and camping

Gardening and horticulture