# Brian H. Clowers

Assistant Professor of Chemistry

Washington State University• Pullman, WA 99164
Phone: 509-335-4300 • e-mail: brian.clowers@wsu.edu


## Education

**Doctor of Philosophy**, Chemistry 2005
Washington State University, Pullman, WA
Field of Specialty: Analytical Chemistry
Dissertation Title: *Separation of Gas Phase Isomers Using Ion Mobility and Mass Spectrometry*
Advisor: Prof. Herbert H. Hill

**Bachelors of Science**, Chemistry (ACS Certified) 2000
University of Nevada, Reno, NV
Thesis Title: *Characterization of Diesel Particulate Exposure Levels Experienced by Underground Mine Workers*
Advisor: Prof. Kent Ervin

**Post-Doctoral Research Scientist** 2006-2008
Biological Separations and Mass Spectrometry
Fundamental Science Directorate
Pacific Northwest National Laboratory
Advisor: Dr. Richard D. Smith

**Post-Doctoral Research Fellow** 2005-2006
Department of Chemistry
University of California, Davis
Advisors: Drs. Carlito B. Lebrilla & Jerry L. Hedrick

## Professional Experience

**Assistant Professor** 2013-Present
Department of Chemistry
Washington State University

**Research Scientist** 2008-2013
Chemical and Biological Sciences
National Security Directorate
Pacific Northwest National Laboratory

## Awards and Recognition

Outstanding Performance Award (2009)

- National Security Directorate, Pacific Northwest National Laboratory

Post-Doctoral Fellowship (2005-2006)

- NIH Fertilization and Early Development Training Grant

NSF Fellowship (2001-2005)

- NSF IGERT Program

## Professional Affiliations

American Society for Mass Spectrometry
International Society for Ion Mobility Spectrometry
American Chemical Society
-Analytical Chemistry Division

## Grants

MUSC13003 PI: Clowers 3/2013 – 02/2016
Department of Homeland Security (DHS/DNDO)
Curriculum and Faculty Development in Technical Nuclear Forensics at Washington State University
Role: PI
PI Commitment: 0 person months
Amount: $200K
Note: *Project awarded with Clowers as WSU Faculty*.

Technical Scientific Working Group PI: Wahl 5/2014 – 06/2015
Utility of Proteomics in Microbial Forensic Settings
Role: WSU Subcontract
PI Commitment: 2 person months
Amount: $870K (Clowers Subcontract: $26K)
*Note: This award was proposed by Clowers prior to joining WSU and serves as a joint appointment mechanism.*

Office of Graduate Research, WSU PI: Clowers 5/2014 – 7/2015
Optically Enhanced Mobility Separations: Selective Assessment of Stereochemistry
Role: PI
PI Commitment: 0 person months
Amount: $26K
*Note: Project awarded as an outcome of the 2014 Grant Writers' Workshop with a subsequent NSF proposal submitted in July of 2014 that is awaiting a decision.*

Defense Thread Reduction Agency (DTRA) PI: Clowers 10/2013 – 9/2016
Field Detection and Quantification of Inorganic Species from Surfaces
Role: co-PI
PI Commitment: 1 person month
Amount: $1050K (Clowers Total: $572K over three years)
*Note: Basic research award is distributed between Clowers and Wall (WSU) with subcontracts to Oak Ridge and Savannah River National Laboratories.*

Defense Thread Reduction Agency (DTRA) PI: Kreuzer 07/2011-07/2013
Genomic and Phenotypic Characterization of *Yersinia pestis* During Long-term Serial Passaging
Role: Co-Investigator
Amount: $1110K
*Note: Final project closeout and results were completed after moving to WSU.*

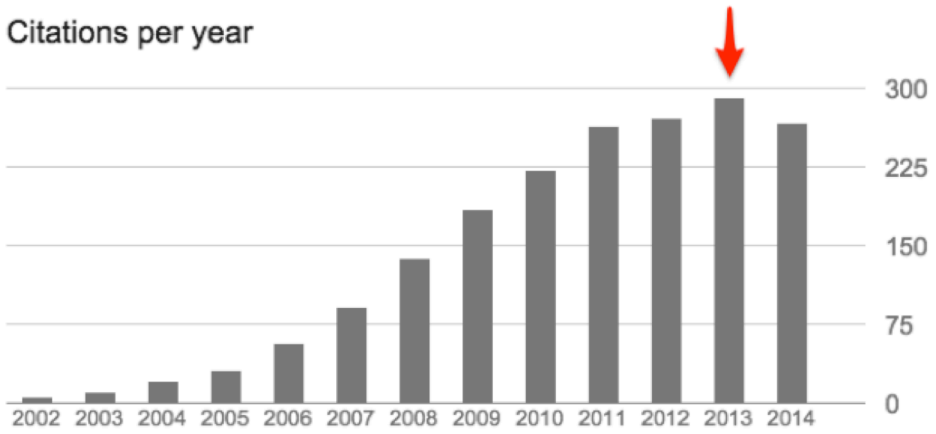
PNNL National Security Directorate LDRD PI: Clowers FY 2011-2012
Statistically Significant Forensic Fingerprinting: Protein Analysis of Biological Agents
Amount: $180K

NSD PNNL Explosive Initiative LDRD PI: Clowers FY 2009-2010
Enhanced Detection Mechanisms for Ion Mobility Spectrometry
Amount: $220K

PNNL Data Intensive Computing Initiative LDRD PI: Beagley FY 2008
Intelligent Compression and Data Organization for Multidimensional Data Volumes
Amount: $56K

## Peer-Reviewed Publications

As of December 27, 2014, the following publications have yielded over 1800 citations with an h-index of 24.




Arrow denotes beginning of tenure track (2013).
Source: http://scholar.google.com/citations?user=AugbEVsAAAAJ&hl=en updated 12/27/2014

47. Andy Lin, A., Merkley, E.D., Clowers, B.H., Hutchison, J.R., Kreuzer, H.K. Effects of Bacterial Inactivation Methods on Downstream Proteomic Analysis. Journal of Microbiological Methods, Submitted November 2014.

46. Leiser, O.P., Merkley, E.D., Clowers, B.H., Deatherage-Kaiser, B.L., Hutchison, J.R., Wagner, D.M., Keim, P.S., Kreuzer, H., Foster, J.T. Whole-genome sequencing of Yersinia pestis after repeated laboratory passaging reveals potential biomarkers. PLOS ONE, Submitted for Publication October 2014.

45. Merkley, E., Leiser, O., Kaiser, B., Clowers, B.H., Lin, A., Hutchison, J., Melville, A., Ansong, C., Wagner, D., Keim, P., Foster, J., Kreuzer, H. Protein Expression Changes Resulting from Long-term Laboratory Passaging of Environmental Isolates of Yersinia pestis. Journal of Proteome Research, Submitted for Publication October 2014.

44. Prost, S. A., Crowell, K. L., Baker, E. S., Ibrahim, Y. M., Clowers, B. H., Monroe, M. E., Anderson, G.A., Smith, R.D., Payne, S. Detecting and Removing Data Artifacts in

Hadamard Transform Ion Mobility-Mass Spectrometry Measurements. Journal of the American Society for Mass Spectrometry, 2014, 1-8.

43. Webb-Robertson, B.J.M., Corley, C.D., McCue, L.A., Clowers, B.H., Dowling, C.P. Forensic Signature Detection of *Yersinia pestis* Culturing Practices across Institutions Using a Bayesian Network. J Forensic Investigation, 2014. 2(1), 7.

42. Wunschel, D.S., E. Tulman, H. Engelmann, B.H. Clowers, S. Geary, A. Robinson, L. Xiaofen. Forensic proteomics of poxvirus production. Analyst. 2013: 138(21) p. 6385-6397.

41. Ewing, R.G., B.H. Clowers, D.A. Atkinson. Direct Real-Time Detection of Vapors from Explosive Compounds. Analytical Chemistry. 2013. 85(22): p. 10977-10983.

40. Wunschel, D.S., H. Engelmann, K. Victry, B.H. Clowers, C. Sorensen, N.B. Valentine, C. Mahoney, Christine, T. Wietsma, K.L. Wahl. Protein markers for identification of Yersinia pestis and their variation related to culture. Molecular and Cellular Probes. 1-8. In Press, 2013.

39. Clowers, B.H., D.S. Wunschel, H.E. Kreuzer, H. Engelmann, N.B. Valentine, K.L. Wahl. Characterization of Residual Medium Peptides from *Yersinia pestis* Cultures. Analytical Chemistry. 2013. 85(8): p. 3933-3939.

38. Robert Ewing, David A. Atkinson, Brian H. Clowers. Direct Real-Time Detection of RDX Vapors Under Ambient Conditions. Analytical Chemistry. 2013. 85(1); p. 389-397.

37. Davis, E.J., B.H. Clowers, W.F. Siems, H.H. Hill. Comprehensive software suite for the operation, maintenance, and evaluation of an ion mobility spectrometer. International Journal for Ion Mobility Spectrometry. 2011, 14(2-3): p. 117-124.

36. Froehlich, J.W., M. Barboza, C. Chu, L.A. Lerno, B.H. Clowers, A.M. Zivkovic, J.B. German, and C.B. Lebrilla. Nano-LC-MS/MS of Glycopeptides Produced by Nonspecific Proteolysis Enables Rapid and Extensive Site-Specific Glycosylation Determination. Analytical Chemistry, 2011. 83(14): p. 5541-5547.

35. Shah, A.R., J. Davidson, M.E. Monroe, A.M. Mayampurath, W.F. Danielson, Y. Shi, A.C. Robinson, B.H. Clowers, M.E. Belov, G.A. Anderson, and R.D. Smith. An Efficient Data Format for Mass Spectrometry-Based Proteomics. Journal of the American Society for Mass Spectrometry, 2010. 21(10): p. 1784-1788.

34. Fraga, C.G., B.H. Clowers, R.J. Moore, and E.M. Zink. Signature-Discovery Approach for Sample Matching of a Nerve-Agent Precursor Using Liquid Chromatography-Mass Spectrometry, XCMS, and Chemometrics. Analytical Chemistry, 2010. 82(10): p. 4165-4173.

33. Zhu, M.L., B. Bendiak, B.H. Clowers, and H.H. Hill. Ion mobility-mass spectrometry analysis of isomeric carbohydrate precursor ions. Analytical and Bioanalytical Chemistry, 2009. 394(7): p. 1853-1867.

32. Tolmachev, A.V., B.H. Clowers, M.E. Belov, and R.D. Smith. Coulombic Effects in Ion Mobility Spectrometry. Analytical Chemistry, 2009. 81(12): p. 4778-4787.

31. Johnson, T.J., Y.F. Su, N.B. Valentine, H.W. Kreuzer-Martin, K.L. Wahl, S.D. Williams, B.H. Clowers, and D.S. Wunschel. The Infrared Spectra of Bacillus Bacteria Part I: Vegetative Bacillus versus Sporulated Cells and the Contributions of Phospholipids to Vegetative Infrared Spectra. Applied Spectroscopy, 2009. 63(8): p. 899-907.

30. Dodds, E.D., R.R. Seipert, B.H. Clowers, J.B. German, and C.B. Lebrilla. Analytical Performance of Immobilized Pronase for Glycopeptide Footprinting and Implications for Surpassing Reductionist Glycoproteomics. Journal of Proteome Research, 2009. 8(2): p. 502-512.

29. Chu, C.S., M.R. Ninonuevo, B.H. Clowers, P.D. Perkins, H.J. An, H.F. Yin, K. Killeen, S. Miyamoto, R. Grimm, and C.B. Lebrilla. Profile of native N-linked glycan structures from human serum using high performance liquid chromatography on a microfluidic chip and time-of-flight mass spectrometry. Proteomics, 2009. 9(7): p. 1939-1951.

28. Beagley, N., C. Scherrer, Y. Shi, B.H. Clowers, W.F. Danielson, and A.R. Shah. Increasing the Efficiency of Data Storage and Analysis Using Indexed Compression. Fifth IEEE International Conference on e-Science. p. 66-71.

27. Seipert, R.R., E.D. Dodds, B.H. Clowers, S.M. Beecroft, J.B. German, and C.B. Lebrilla. Factors that influence fragmentation behavior of N-linked glycopeptide ions. Analytical Chemistry, 2008. 80(10): p. 3684-3692.

26. Lopez-Ferrer, D., K. Petritis, N.M. Lourette, B.H. Clowers, K.K. Hixson, T. Heibeck, D.C. Prior, L. Pasa-Tolic, D.G. Camp, M.E. Belov, and R.D. Smith. On-line Digestion System for Protein Characterization and Proteome Analysis. Analytical Chemistry, 2008. 80(23): p. 8930-8936.

25. Dodds, E.D., B.H. Clowers, P.J. Hagerman, and C.B. Lebrilla. Systematic characterization of high mass accuracy influence on false discovery and probability scoring in peptide mass fingerprinting. Analytical Biochemistry, 2008. 372(2): p. 156-166.

24. Clowers, B.H., Y.M. Ibrahim, D.C. Prior, W.F. Danielson, M.E. Belov, and R.D. Smith. Enhanced ion utilization efficiency using an electrodynamic ion funnel trap as an injection mechanism for ion mobility spectrometry. Analytical Chemistry, 2008. 80(3): p. 612-623.

23. Clowers, B.H., E.D. Dodds, R.R. Seipert, and C.B. Lebrilla. Dual polarity accurate mass calibration for electrospray ionization and matrix-assisted laser desorption/ionization mass spectrometry using maltooligosaccharides. Analytical Biochemistry, 2008. 381(2): p. 205-213.

22. Clowers, B.H., M.E. Belov, D.C. Prior, F.D. William, Y. Ibrahim, and R.D. Smith. Pseudorandom sequence modifications for ion mobility orthogonal time-of-flight mass spectrometry. Analytical Chemistry, 2008. 80(7): p. 2464-2473.

21. Belov, M.E., B.H. Clowers, D.C. Prior, W.F. Danielson, A.V. Liyu, B.O. Petritis, and R.D. Smith. Dynamically multiplexed ion mobility time-of-flight mass spectrometry. Analytical Chemistry, 2008. 80(15): p. 5873-5883.

20. Kirmiz, C., B. Li, H.J. An, B.H. Clowers, H.K. Chew, K.S. Lam, A. Ferrige, R. Alecio, A.D. Borowsky, S. Sulaimon, C.B. Lebrilla, and S. Miyamoto. A serum glycomics approach to breast cancer biomarkers. Molecular & Cellular Proteomics, 2007. 6(1): p. 43-55.

19. Dwivedi, P., B. Bendiak, B.H. Clowers, and H.H. Hill. Rapid resolution of carbohydrate isomers by electrospray ionization ambient pressure ion mobility spectrometry-time-of-flight mass spectrometry (ESI-APIMS-TOFMS). Journal of the American Society for Mass Spectrometry, 2007. 18(7): p. 1163-1175.

18. Clowers, B.H., E.D. Dodds, R.R. Seipert, and C.B. Lebrilla. Site determination of protein glycosylation based on digestion with immobilized nonspecific proteases and Fourier transform ion cyclotron resonance mass spectrometry. Journal of Proteome Research, 2007. 6: p. 4032- 4040.

17. Chavarra-Miranda, D., B.H. Clowers, G. Anderson, and M. Belov. Simulating data processing for an advanced ion mobility mass spectrometer, Proceedings of the 1st International Workshop on High-performance Reconfigurable Computing Technology and Applications, ACM: Reno, Nevada. p. 21-29.

16. Baker, E.S., B.H. Clowers, F.M. Li, K. Tang, A.V. Tolmachev, D.C. Prior, M.E. Belov, and R.D. Smith, Ion mobility spectrometry-mass spectrometry performance using electrodynamic ion funnels and elevated drift gas pressures. Journal of the American Society for Mass Spectrometry, 2007. 18(7): p. 1176-1187.

15. Ninonuevo, M.R., Y. Park, H.F. Yin, J.H. Zhang, R.E. Ward, B.H. Clowers, J.B. German, S.L. Freeman, K. Killeen, R. Grimm, and C.B. Lebrilla. A strategy for annotating the human milk glycome. Journal of Agricultural and Food Chemistry, 2006. 54(20): p. 7471-7480.

14. Dwivedi, P., C. Wu, L.M. Matz, B.H. Clowers, W.F. Siems, and H.H. Hill. Gas-phase chiral separations by ion mobility spectrometry. Analytical Chemistry, 2006. 78(24): p. 8200-8206.

13. Clowers, B.H., W.F. Siems, H.H. Hill. and S.M. Massick. Hadamard transform ion mobility spectrometry. Analytical Chemistry, 2006. 78(1): p. 44-51.

12. Clowers, B.H. and H.H. Hill. Influence of cation adduction on the separation characteristics of flavonoid diglycoside isomers using dual gate-ion mobility-quadrupole ion trap mass spectrometry. Journal of Mass Spectrometry, 2006. 41(3): p. 339-351.

11. Steiner, W.E., S.J. Klopsch, W.A. English, B.H. Clowers, and H.H. Hill. Detection of a chemical warfare agent simulant in various aerosol matrixes by ion mobility time-of-flight mass spectrometry. Analytical Chemistry, 2005. 77(15): p. 4792-4799.

10. Clowers, B.H. and H.H. Hill. Mass analysis of mobility-selected ion populations using dual gate, ion mobility, quadrupole ion trap mass spectrometry. Analytical Chemistry, 2005. 77(18): p. 5877-5885.

9. Clowers, B.H., P. Dwivedi, W.E. Steiner, H.H. Hill. and B. Bendiak. Separation of sodiated isobaric disaccharides and trisaccharides using electrospray ionization-atmospheric pressure ion mobility- time of flight mass spectrometry. Journal of the American Society for Mass Spectrometry, 2005. 16(5): p. 660-669.

8. Steiner, W.E., B.H. Clowers, W.A. English, and H.H. Hill. Atmospheric pressure matrix-assisted laser desorption/ionization with analysis by ion mobility time-of-flight mass spectrometry. Rapid Communications in Mass Spectrometry, 2004. 18(8): p. 882-888.

7. Steiner, W.E., B.H. Clowers, and H.H. Hill. Rapid separation of phenylthiohydantoin amino acids: ambient pressure ion-mobility mass spectrometry (IMMS). Analytical and Bioanalytical Chemistry, 2003. 375(1): p. 99-102.

6. Steiner, W.E., B.H. Clowers, P.E. Haigh, and H.H. Hill. Secondary ionization of chemical warfare agent simulants: Atmospheric pressure ion mobility time-of-flight mass spectrometry. Analytical Chemistry, 2003. 75(22): p. 6068-6076.

5. Steiner, W.E., B.H. Clowers, L.M. Matz, W.F. Siems, and H.H. Hill. Rapid screening of aqueous chemical warfare agent degradation products: Ambient pressure ion mobility mass spectrometry. Analytical Chemistry, 2002. 74(17): p. 4343-4352.

4. Matz, L.M., W.E. Steiner, B.H. Clowers, and H.H. Hill. Evaluation of micro-electrospray ionization with ion mobility spectrometry/mass spectrometry. International Journal of Mass Spectrometry, 2002. 213(2-3): p. 191-202.

3. Steiner, W.E., B.H. Clowers, K. Fuhrer, M. Gonin, L.M. Matz, W.F. Siems, A.J. Schultz, and H.H. Hill. Electrospray ionization with ambient pressure ion mobility separation and mass analysis by orthogonal time-of-flight mass spectrometry. Rapid Communications in Mass Spectrometry, 2001. 15(23): p. 2221-2226.

2. Matz, L.M., B.H. Clowers, W.E. Steiner, W.F. Siems, and H.H. Hill, Liquid-sheath-flow electrospray ionization feasibility study of direct water analysis with the use of high-resolution ion-mobility spectrometry. Field Analytical Chemistry and Technology, 2001. 5(1-2): p. 91-96.

1. Clowers, B.H., W.E. Steiner, H.M. Dion, L.M. Matz, M. Tam, E.E. Tarver, and H.H. Hill, Evaluation of sulfonylurea herbicides using high resolution electrospray ionization ion mobility quadrupole mass spectrometry. Field Analytical Chemistry and Technology, 2001. 5(6): p. 302-312.

## Conference Proceedings

Since 2005 over 60 scientific presentations have been given in both oral and poster formats at a range of national and international conference venues. Recent presentations include:

11. Modification of Drift Gas Composition to Isolate Chemical Classes Using Drift-Tube Ion Mobility Mass Spectrometry. Brian H. Clowers, Zhihao Yu, Austen Davis. Oregon State University Mass Spectrometry Symposium. September 24, 2014, Corvallis, OR. (Invited Oral Presentation)

10. Metabolite Detection of *Naegleria* species using Ion Mobility Mass Spectrometry. X. Zhang, Z. Yu, Clowers, B. H., Hill, H. H., Miller, H., Puzon, G.J. 2014 American

Water Works Association Annual Meeting. "Innovative Microbial Testing Methods," Wednesday, November 19, 2014. Atlanta, GA. (Invited Oral Presentation)

9. Maximizing the Multiplexing Advantage: Mobility-Specific Sources of Transform Error and Means of Correction. Brian H. Clowers, Xing Zhang, William F. Siems. 62nd American Society for Mass Spectrometry. Baltimore, MD. June 2014.

8. Yu, Z., Zhang, X., Miller, H., Puzon, G. F., Clowers, B. H. Optimized metabolite extraction procedure for the detection of *Naegleria fowleri* in aqueous systems using Ion mobility and Mass Spectrometry. Northwest Regional Meeting of the American Chemical Society, Monday, June 23, 2014.

7. Davis, A. L., Hauck, B., Clowers, B. H. Rapid analysis of uranium complexes using nanoDESI and Ion Mobility-Mass Spectrometry. Northwest Regional Meeting of the American Chemical Society, Monday, June 23, 2014.

6. Brian H. Clowers, Zheng Xing, William F. Siems. Annual Southeastern Regional American Chemical Society Meeting, November 3, 2013, Atlanta, GA. (Invited Oral Presentation)

5. Ion Mobility Multiplexing and Hadamard Encoding Errors, Brian H. Clowers, Zheng Xing, William F. Siems. Annual Southeastern Regional American Chemical Society Meeting, November 3, 2013, Atlanta, GA. (Invited Oral Presentation)

4. Media Derived Protein Profiles of Microbial Samples, Brian H. Clowers, David Wunschel, Nancy B. Valentine, Heather Engelmann, Karen Wahl. White House Interagency Microbial Forensics Advisory Board, Non-Genomic Forensic Signatures, July 12, 2012, Springfield, VA. (Invited Oral Presentation)

3. Forensic Characterization of Microbial Growth Conditions using Emergent Peptide Signatures. Brian H. Clowers, Helen Kreuzer, David S. Wunschel, Heather Engelmann, Nancy B. Valentine, Karen L. Wahl. 5th National Biothreat Conference, 2012, Denver, CO. (Poster Presentation)

2. Forensic Identification of Growth Conditions Using Residual Medium Peptides. Brian H. Clowers, Helen Kreuzer, David S. Wunschel, Heather Engelmann, Nancy B.

Valentine, Karen L. Wahl. DTRA Chemical and Biological Science and Technology Conference, 2011, Las Vegas, NV. (Invited Oral Presentation)

1. Analysis of Proteins and Metabolites of Unknown Samples to Complement Genetic Characterizations. Karen Wahl, Nancy Valentine, Brian H. Clowers, David Wunschel, Christopher Ehrhardt, Heather Engelmann, Angela Melville, Kathryn Antolick, Jon Wahl, Janine Hutchison, Christina Sorensen. DHT Science and Technology Biological Forensics Review, 2011, Alexandria, VA. (Oral Presentation)

## Book Chapters

1. Wahl, Karen L., Wunschel, David S. and Clowers, Brian H. 2010. "Proteomics Development and Application for Bioforensics." Chapter 26 in Microbial Forensics, 2nd Edition, ed. B Budowle, SE Schutzer, RG Breeze, PS Keim and SA Morse, pp. 449-460. Academic Press/Elsevier, Burlington, MA.

## Patents/Invention Disclosures

3. System and process for selective detection of vapor-phase analytes. US Pat. 20130260478, 2013.
   - *Licensed by Agilent Technologies 2011*
2. Ion funnel ion trap and process. US Pat. 12156360, 2010
   - *Licensed by Agilent Technologies 2011*
1. Mass analysis of mobility selected ion populations US Pat. 11582198, 2007
   - *Licensed by ExcellIMS 2013*

## Mentoring

### Graduate Students

**Austin Davis (09/2013 – Present)**

**Conference Presentations:**

- Davis, A. L., Hauck, B., Clowers, B. H. Rapid analysis of uranium complexes using nanoDESI and Ion Mobility-Mass Spectrometry. Northwest Regional Meeting of the American Chemical Society, Monday, June 23, 2014.

**Zhihao (Joe) Yu (11/2013 – Present)**

**Conference Presentations:**

- Yu, Z., Zhang, X., Miller, H., Puzon, G. F., Clowers, B. H. Optimized metabolite extraction procedure for the detection of *Naegleria fowleri* in aqueous systems using Ion mobility and Mass Spectrometry. Northwest Regional Meeting of the American Chemical Society, Monday, June 23, 2014.
- Metabolite Detection of *Naegleria* species using Ion Mobility Mass Spectrometry. X. Zhang, Z. Yu, Clowers, B. H., Hill, H. H., Miller, H., Puzon, G.J. 2014 American Water Works Association Annual Meeting. "Innovative Microbial Testing Methods," Wednesday, November 19, 2014. Atlanta, GA. (Invited Oral Presentation)

**Kelsey Morrison (07/2014 – Present)**

## Undergraduate Students

Garret Radley

- (09/2013 – 5/2014) Graduated 2014, Mechanical Engineering

Arnikan Baleswarikan

- (09/2013 – Present) Anticipated Graduation 2017, Electrical Engineering

Noor Alaa Aly

- (09/2014 – Present) Anticipated Graduation 2015, Biology

## Teaching Experience

CHEM520

- Spring 2014: 15 Students
- Critiques: Team Taught Class. No specific comments were provided.

CHEM425, Instrumental Analysis, Washington State University, Department of Chemistry

- Spring 2014: 15 Students
- Critiques: Instructor ??/5; Course ??/5

CHEM220

- Fall 2014: 37 Students
- Critiques: Instructor ??/5; Course ??/5

## Service

### Committees

- Member of the 2013 WSU Analytical Chemistry Faculty Search Committee. (2013-2014).
- Member of the 2014 WSU Tissue and Proteomics Imaging Laboratory Personnel Search Committee. (2014-2015).
- Member of the 2014 Graduate Student Admissions Committee. (Spring 2014).

### Symposium Organization

"Fundamentals of Atmospheric Pressure Ionization Techniques." 2013 American Society for Mass Spectrometry Annual Meeting, Baltimore, MD.

### Professional Service

ASMS Short Course Instructor 2013-Present: Ion Mobility Mass Spectrometry
Guest Editor for International Journal for Ion Mobility Spectrometry, Special Edition, 2015

### Peer Reviewing Activities

**Journals:**

- Analytical Chemistry
- Journal of the American Society for Mass Spectrometry
- Journal of Mass Spectrometry
- Journal of Chromatography A
- Physical Chemistry Chemical Physics
- International Journal for Ion Mobility Spectrometry

**Agency Service:**

- DOE SBIR
- PNNL/EMSL
- NSF
- NIH