

# Ruth Waddell Smith, Ph.D.

---

**Address:** Forensic Science Program  
School of Criminal Justice  
Michigan State University  
Chemistry Building, Rm 319  
578 S Shaw Lane  
East Lansing, MI 48824

**Work:** (517) 353-5283  
**Cell:** (616) 765-2022  
**E-mail:** [rwsmith@msu.edu](mailto:rwsmith@msu.edu)

---

## POSITIONS HELD

**Associate Professor, Forensic Chemistry**  
2011 – present

**Michigan State University**  
Forensic Science Program

**Assistant Professor, Forensic Chemistry**  
2005 – 2011

**Michigan State University**  
Forensic Science Program

**Postdoctoral Research Associate**  
2003 – 2005

**Los Alamos National Laboratory**  
Analytical Chemistry Division

**Research Assistant**  
2002 – 2003

**University of Strathclyde**  
Forensic and Analytical Chemistry

---

## EDUCATION

**1999 – 2003**      **Ph.D., Forensic & Analytical Chemistry**  
**University of Strathclyde**

Advisors: Prof. Niamh NicDaéid and Prof. David Littlejohn

Dissertation: *Organic and Trace Metal Impurity Profiling in Illicit Ecstasy Seizures with the Application of Chemometric Procedures*

**1994 – 1999**      **B.Sc. (Hons, 1<sup>st</sup> class), Forensic & Analytical Chemistry**  
**University of Strathclyde**

---

## PROFESSIONAL AFFILIATIONS

2015 – present

Fellow, American Academy of Forensic Science

**Professional Affiliations contd.**

2006 – 2015	Member, American Academy of Forensic Sciences
2005 – present	Member, American Society for Mass Spectrometry
2002 – 2011	Member, American Chemical Society

---

**PROFESSIONAL SERVICE**

**Service for School of Criminal Justice**

2016 – 2017	Faculty Advisory Committee
2016 – present	Hearing Board
2013 – 2015	Reappointment, Promotion, and Tenure Advisory Subcommittee
2013 – 2014	Hearing Board
2006 – 2008	Academic Policies Committee
2005 – present	Forensic Science Program Admissions

**Service for College of Social Science**

Spring 2014	Curriculum Committee
-------------	----------------------

**Service for Michigan State University**

October 2015	Faculty Grievance Appeal Panel
--------------	--------------------------------

**Service for the Scientific Community**

2017	Proposal reviewer, National Institute of Justice
2017	Invited guest, Scientific Working Group for Seized Drug Analysis
2016 – present	Member, Seized Drug Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science
2016 – present	Member, Editorial Board for <i>Forensic Chemistry</i>
2015	External reviewer for forensic science program
2014	Technical report reviewer, National Institute of Justice
2012	Panelist, National Science Foundation Workshop, <i>Strengthening Forensic Science through Connections with Analytical Sciences</i>
2009	Guest editor, <i>Analytical and Bioanalytical Chemistry</i> , Special Issue on Forensic Analysis
2009 – 2010	Chair, American Chemical Society Local Section (MSU)
2007 – present	Member, Editorial Board for <i>Journal of Forensic Sciences</i>
2007 – present	Guest reviewer for the following journals: <i>Analyst</i> , <i>Analytical Chemistry</i> , <i>Analytical Methods</i> , <i>Forensic Science International</i> , <i>Journal of Chromatography A</i> , <i>Rapid Communications in Mass Spectrometry</i> , <i>Science and Justice</i> , <i>Spectrochimica Acta Part B</i> , <i>Spectroscopy Letters</i>

R. Smith

### Service for the Public

- 2012 – present Co-organizer, *Crime Scene Investigation Program*, Michigan State University, East Lansing, MI
- 2006 – present Supervisor, *Science Olympiad Forensic Science Section (State Finals)*, Michigan State University, East Lansing, MI
- 2005 – 2011 Organizer, *Chemistry Day Forensic Science Demonstration*, Impression 5 Science Museum, Lansing, MI
- 2005 – 2009 Organizer, *Forensic Science at Girls Math Science Conference*, Michigan State University, East Lansing, MI
- 

### RESEARCH FUNDING

Statistical and Mass Spectral Tools for the Identification and Characterization of Synthetic Phenethylamines, *National Institute of Justice*, **\$239,652**, 1/16 – 12/17. Role: PI

Inductively Coupled Plasma Mass Spectrometry for the Detection of Characteristic Tattoo Components Found in Tissue Samples in Late-Stage Putrefaction, *Forensic Sciences Foundation Lucas Grant*, **\$3,524**, 9/14 – 12/16. Role: PI

Classification of Synthetic Designer Drugs using Mass Spectrometry Methods, *Faculty Initiatives Funding, Michigan State University*, **\$3,995**, 7/15 – 6/16. Role: PI

Developing Guidelines for the Application of Multivariate Statistical Analysis to Forensic Evidence, *National Institute of Justice*, **\$272,220**, 1/12 – 12/13. Role: PI

Random Probability Match Procedure for Statistical Comparison of Mass Spectral Data, *Midwest Forensics Resource Center*, **\$70,178**, 1/12 – 3/13. Role: Co-PI.

An Examination of the Conditions Affecting Forensic Scientists' Workplace Productivity and Occupational Stress, *National Institute of Justice*, **\$129,376**, 1/12 – 12/12. Role: Co-PI, 5% effort.

Statistical Evaluation of MDMA Impurity Profiles for Source Determination *Forensic Sciences Foundation Lucas Grant*, **\$2,500**, 9/11 – 12/12. Role: PI.

Application of Multivariate Statistical Procedures in Fire Debris Analysis: Investigating Matrix Interference Effects and Weathering of Ignitable Liquids on Association of Ignitable Liquid Residues to Neat Ignitable Liquids, *Midwest Forensics Resource Center*, **\$51,167**, 1/11 – 12/11. Role: PI.

Further Studies on the Detection of Gunshot Residue in Tissue Samples using Inductively Coupled Plasma Mass Spectrometry, *Forensic Sciences Foundation Lucas Grant*, **\$2,500**, 9/10 – 12/11. Role: PI.

R. Smith

### **Research Funding contd.**

Multivariate Statistical Procedures for the Analysis of Questioned Documents: Improving Current Practices, *Faculty Initiatives Funding, Michigan State University*, **\$8,096**, 8/10 – 6/11. Role: PI.

Detection of Gunshot Residue from Decomposing Tissue Samples using Inductively Coupled Plasma Mass Spectrometry, *American Academy of Forensic Sciences Pathology/Biology Section Research Grant*, **\$2,990**, 3/10 – 12/10. Role: PI.

Comparison of Gas Chromatography-Mass Spectrometry and Liquid Chromatography-Mass Spectrometry for Discrimination of *Salvia divinorum* from Related *Salvia* Species using Chemometric Procedures, *Midwest Forensics Resource Center*, **\$54,839**, 1/10 – 12/10. Role: Co-PI.

Further Investigation of Trace Element Concentrations for Discrimination of Recycled Document Papers, *Forensic Sciences Foundation Lucas Grant*, **\$1,800**, 9/09 – 12/10. Role: PI.

Development of Microwave-Assisted Extraction Procedures for Organic Impurity Profiling of Seized 3,4-Methylenedioxyamphetamine (MDMA), *Forensic Sciences Foundation Lucas Grant*, **\$1,250**, 9/08 – 12/09. Role: PI.

Application of Chemometric Procedures to Differentiate Ignitable Liquid Residues from Substrate Interferences for Arson Investigations. Part I: Creating Reference Collections and Optimizing Data Analysis Procedures, *Midwest Forensics Resource Center*, **\$54,886**, 1/09 – 12/09. Role: PI.

Detection of Gunshot Residue from Larvae and Decomposing Tissue Samples Using Inductively Coupled Plasma Mass Spectrometry (ICP-MS), *Forensic Sciences Foundation Lucas Grant*, **\$2,400**, 9/07 – 12/08. Role: PI.

Optimization of Headspace Solid Phase Microextraction (HS-SPME) for Organic Impurity Profiling of Illicit MDMA Tablets *Midwest Forensics Resource Center*, **\$27,208**, 2/07 – 10/07. Role: PI.

---

## **PUBLICATIONS**

### **Peer-Reviewed Articles** († denotes graduate student)

32. †Reese KL, Jones AD, **Waddell Smith R**. Characterization of Smokeless Powders using Multiplexed Collision-Induced Dissociation Mass Spectrometry and Chemometric Procedures. *Forensic Science International* **2017**, 272, 16-27.
31. †Bodnar-Willard MA, McGuffin VL, **Waddell Smith R**. Statistical Comparison of Mass Spectra for Identification of Amphetamine-Type Stimulants. *Forensic Science International* **2017**, 270, 111-120.

**Peer-Reviewed Articles contd.**

30. **Waddell Smith R**, †Brehe RJ, †McIlroy JW, McGuffin, VL. Mathematically Modeling Chromatograms of Evaporated Ignitable Liquids for Fire Debris Applications. *Forensic Chemistry* **2016**, 2, 37-45.
29. Holt TJ, Blevins KR, **Waddell Smith R**. Examining the Impact of Organizational and Individual Characteristics on Forensic Scientists' Job Stress and Satisfaction. *Journal of Crime and Justice* **2016** doi: 10.1080/0735648X.2016.1216731.
28. †Hogg SR, Hunter BC, **Waddell Smith R**. Elemental Characterization and Discrimination of Non-Toxic Ammunition using Scanning Electron Microscopy with Energy Dispersive X-Ray Analysis and Principal Components Analysis. *Journal of Forensic Sciences* **2016**, 61, 35-42.
27. †McIlroy JW, **Waddell Smith R**, Victoria L. McGuffin VL. Assessing the Effect of Data Pretreatment Procedures for Principal Components Analysis of Chromatographic Data. *Forensic Science International* **2015**, 257, 1-12.
26. †McManaman KM, **Waddell Smith R**. Effect of Extraction Procedure and Gas Chromatography Temperature Program on Discrimination of MDMA Exhibits. *Journal of Forensic Sciences* **2014**, 59, 327-336.
25. †Prather KR, †Towner SE, McGuffin VL, **Waddell Smith, R**. Effect of Substrate Interferences from High-Density Polyethylene on Association of Simulated Ignitable Liquid Residues to the Corresponding Liquid. *Journal of Forensic Sciences* **2014**, 59, 52-60.
24. †Bodnar-Willard MA, **Waddell Smith R**, McGuffin VL. Statistical Approach to Establish the Equivalence of Unabbreviated Mass Spectra. *Rapid Communications in Mass Spectrometry* **2014**, 28, 83-95.
23. †Prather KR, McGuffin VL, **Waddell Smith R**. Effect of Evaporation and Matrix Interferences on the Association of Simulated Ignitable Liquid Residues to the Corresponding Liquid Standard. *Forensic Science International* **2012**, 222, 242-251.
22. †Bodnar-Willard MA, McGuffin VL, **Waddell Smith R**. Forensic Analysis of *Salvia divinorum* using Multivariate Statistical Procedures. Part I: Discrimination from Related *Salvia* Species. *Analytical and Bioanalytical Chemistry* **2012**, 402, 833-842.
21. †Bodnar-Willard MA, McGuffin VL, **Waddell Smith R**. Forensic Analysis of *Salvia divinorum* using Multivariate Statistical Procedures. Part II: Association of Adulterated Samples to *S. divinorum*. *Analytical and Bioanalytical Chemistry* **2012**, 402, 843-850.
20. †Giebink PJ, **Waddell Smith R**. Development of Microwave-Assisted Extraction Procedure for Organic Impurity Profiling of Seized 3,4-Methylenedioxymethamphetamine. *Journal of Forensic Sciences* **2011**, 56, 1483-1492.
19. †Udey RN, Hunter BC, **Waddell Smith R**. Differentiation of Bullet Type Based on Analysis of Gunshot Residue Using Inductively Coupled Plasma Mass Spectrometry. *Journal of Forensic Sciences* **2011**, 56, 1268-1276.

**Peer-Reviewed Articles contd.**

18. †Baernkopf JM, McGuffin VL, **Waddell Smith R**. Association of Ignitable Liquid Residues to Neat Ignitable Liquids in the Presence of Matrix Interferences using Chemometric Procedures. *Journal of Forensic Sciences* **2011**, *56*, 70-81.
17. †LaGoo LM, †Schaeffer LS, Szymanski DW, **Waddell Smith R**. Detection of Gunshot Residue in Blowfly Larvae and Decomposing Porcine Tissue using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). *Journal of Forensic Sciences* **2010**, *55*, 624-632.
16. †Baernkopf JM, McGuffin VL, **Waddell Smith R**. Effect of GC Temperature Program on the Association and Discrimination of Diesel Samples. *Journal of Forensic Sciences* **2010**, *55*, 185-192.
15. †McGaw EA, Szymanski DW, **Waddell Smith R**. Determination of Trace Elemental Concentrations in Document Papers for Forensic Comparison using Inductively Coupled Plasma Mass Spectrometry. *Journal of Forensic Sciences* **2009**, *54*, 1163-1170.
14. †McGaw EA, Szymanski DW, **Waddell Smith R**. Characterization of Undigested Particulate Material following Microwave Digestion of Recycled Document Papers. *Journal of Forensic Sciences* **2009**, *54*, 1171-1175.
13. **Waddell Smith R**, McGuffin VL. The Need for Research in Forensic Science. Editorial for Special Issue on Forensic Analysis. *Analytical and Bioanalytical Chemistry* **2009**, *394*, 1985-1986.
12. †Marshall LJ, †McIlroy JW, McGuffin VL, **Waddell Smith R**. Association and Discrimination of Diesel Fuels using Chemometric Procedures. *Analytical and Bioanalytical Chemistry* **2009**, *394*, 2049-2059.
11. †Scherperel GA, Reid GE, **Waddell Smith R**. Characterization of Smokeless Powders using Nanoelectrospray Ionization Mass Spectrometry (nESI-MS). *Analytical and Bioanalytical Chemistry* **2009**, *394*, 2019-2028.
10. †Hupp AM, †Marshall LJ, Campbell DI, **Waddell Smith R**, McGuffin VL. Chemometric Analysis of Diesel Fuel for Forensic and Environmental Applications. *Analytica Chimica Acta* **2008**, *606*, 159-171.
9. **Waddell Smith R**. A Review of Recent Advances in Profiling Illicit MDMA Samples. *Journal of Forensic Sciences* **2007**, *52*, 1297-1304.
8. NicDaéid N, **Waddell RJH**. The Analytical and Chemometric Procedures used to Profile Illicit Drug Seizures. *Talanta* **2005**, *67*, 280-285.
7. Fliegel D, **Waddell R**, Majidi V, Günther D, Lewis C. Quantification of Aromatic and Halogenated Hydrocarbons and Alcohol Mixtures at the Elemental, Structural, and Parent Molecular Ion Level. *Analytical Chemistry* **2005**, *77*, 1847-1852.
6. **Waddell R**, Lewis C, Hang W, Hassell C, Majidi V. Inductively Coupled Plasma Mass Spectrometry for Elemental Speciation: Applications in the New Millennium. *Applied Spectroscopy Reviews* **2005**, *40*, 33-69.

**Peer-Reviewed Articles contd.**

5. **Waddell R**, Dale DE, Monagle M, Smith SA. Determination of High Explosives from a PTFE Wipe using Thermal Desorption-Gas Chromatography with Electron-Capture Detection. *Journal of Chromatography A* **2005**, 1062, 125-131.
4. Nordon A, **Waddell RJH**, Bellamy LJ, Gachagan A, McNab D, Littlejohn D, Hayward G. Monitoring of a Heterogeneous Reaction by Acoustic Emission. *Analyst* **2004**, 129, 463-467.
3. **Waddell RJH**, NicDaéid N, Littlejohn D. Classification of Ecstasy Tablets using Trace Metal Analysis with the Application of Chemometric Procedures and Artificial Neural Network Algorithms. *Analyst* **2004**, 129, 235-240.
2. Carter KC, Finnon YS, NicDaéid N, Robson D, **Waddell R**. The Effect of Nitrostyrene on Cell Proliferation and Macrophage Immune Responses. *Immunopharmacology and Immunotoxicology* **2002**, 24, 187-197.
1. **Waddell RJH**, Littlejohn D, NicDaéid N. Preliminary Studies Identifying and Quantifying Trace Metal Impurities in Illicit Ecstasy Tablets using Atomic Spectrometry Techniques. *Problems of Forensic Sciences* **2001**, 47, 413-417.

**Book Chapters**

2. **Waddell Smith R**. Chemometrics in Forensic Chemistry. In: J. Siegel, editor. *Forensic Chemistry: Fundamentals and Applications*. Chichester: John Wiley & Sons, 2016.
1. Smith SA, **Waddell Smith R**, Xia Y, Ouyang Z. Introduction to Mass Spectrometry. In: B. Pramanik, M.S. Lee, G. Chen, editors. *Characterization of Impurities and Degradants Using Mass Spectrometry*. New Jersey: John Wiley and Sons, 2011.

---

**UNDERGRADUATE RESEARCH DIRECTED**

5. Joshua Champine. Characterization of Smokeless Powders using Gas Chromatography-Mass Spectrometry, Liquid Chromatography-Mass Spectrometry, and Infrared Spectroscopy. Summer 2015 – Spring 2016.
4. Johanna M. Smeekens. Quantifying Diesel Fuel Extracted from Water for Fuel Spill Remediation using Univariate and Multivariate Calibration Procedures. Summer 2011 – Spring 2012.
3. Johanna M. Smeekens. Optimization of Pulsed Pressure Injection Procedures for the Analysis of Ignitable Liquids using Gas Chromatography-Mass Spectrometry. Summer 2010 – Spring 2011.
2. Emily G. Riddell. Effect of Pulsed Pressure Injection on the Analysis of Gasoline using Gas Chromatography-Mass Spectrometry and Chemometric Procedures. Summer 2009 – Summer 2010.

1. Dahlia I. Campbell. Identification and Correlation of Potential Chemical Fingerprints in Diesel using Gas Chromatography and Mass Spectrometry. McNair/SROP Scholars Program, co-supervised with Dr. Victoria L. McGuffin. Summer 2006.
- 

## **GRADUATE RESEARCH COMMITTEES**

### **M.S. Thesis Committee Chair**

35. Trevor E. Curtis. Chemical Analysis of Tattoo Inks to Aid in the Identification of Highly Decomposed Remains. M.S. Forensic Science, March 2017.
34. Alexandria L. Anstett. Characterization of Synthetic Phenethylamines using Low-Resolution and High-Resolution Mass Spectrometry. M.S. Forensic Science, January 2017.
33. Cynthia J. Kaeser. Synthetic Cathinone Characterization and Isomer Identification using Energy-Resolved Tandem Mass Spectrometry (MS/MS). M.S. Forensic Science, December 2016.
32. Barbara L. Fallon. A Tale of Two *Chorchorus* Species: Jute and its Substitutes in Commercial Goods. M.S. Forensic Science, January 2016.
31. Kristen L. Reese. Association and Differentiation of Corresponding Unburned and Burned Smokeless Powders utilizing Physical Characteristics, Chemical Characteristics, and Multivariate Statistical Analysis. M.S. Forensic Science, October 2015.
30. Rebecca J. Brehe. Overcoming Challenges in Fire Debris Analysis Caused by Evaporation. M.S. Forensic Science, August 2015.
29. Fanny Chu. Improving Methods for the Analysis of Amphetamine-Type Stimulants. M.S. Forensic Science, July 2015.
28. Jordyn L. Geiger. Development of Class Reference Standards for Multivariate Statistical Analysis of Fire Debris. M.S. Forensic Science, August 2014.
27. John W. McIlroy. Effects of Data Pretreatment on the Multivariate Statistical Analysis of Chemically Complex Samples. M.S. Forensic Science, March 2014.
26. Christine E. Hay. Elemental Analysis of Gunshot Residue to Differentiate Bullet Type and Firing Distance. M.S. Forensic Science, September 2013.
25. Seth R. Hogg. Analysis of Lead-Free Ammunition by Scanning Electron Microscopy using Energy Dispersive X-Ray Spectroscopy and Discrimination of Samples using Principal Components Analysis. M.S. Forensic Science, May 2013.
24. Emily G. Riddell. Differentiation of Paper Types using Elemental Profiles Generated using Inductively Coupled Plasma Optical Emission Spectroscopy and Inductively Coupled Plasma Mass Spectrometry. M.S. Forensic Science, April 2013.
23. Monica L. Bugeja. Comparison of Gas Chromatography-Mass Spectrometry and Liquid Chromatography-Mass Spectrometry for Discrimination of *Salvia divinorum* and Related *Salvia* Species Using Chemometric Procedures. M.S. Forensic Science, December 2012.



**M.S. Thesis Committee Chair contd.**

22. Suzanne E. Towner. An Investigation of Unsupervised and Supervised Multivariate Statistical Procedures for the Analysis of Fire Debris. M.S. Forensic Science, August 2012.
21. Karlie M. McManaman. Effects of Extraction Procedure and Gas Chromatography Temperature Program on Discrimination of MDMA Exhibits using Impurity Profiles. M.S. Forensic Science, July 2012.
20. Kaitlin R. Prather. Using Multivariate Statistical Procedures to Identify Ignitable Liquid Residues in the Presence of Interferences. M.S. Forensic Science, July 2011.
19. Tiffany P. Van De Mark. Influence of Evaporation and Matrix Interferences on the Association and Discrimination of Ignitable Liquids using Chemometric Procedures. M.S. Forensic Science, August 2010.
18. Ruth N. Udey. Differentiation of Bullet Type Based on Analysis of Gunshot Residue using Inductively Coupled Plasma Mass Spectrometry. M.S. Forensic Science, May 2010.
17. Melissa A. Bodnar. Forensic Analysis of *Salvia divinorum* and Related *Salvia* Species using Chemometric Procedures. M.S. Forensic Science, March 2010.
16. Patricia J. Joiner. Optimization of a Microwave-Assisted Extraction Procedure for the Extraction of Organic Impurities from Seized MDMA Tablets. M.S. Forensic Science, August 2009.
15. Sarah C. Meisinger. Comparison of Extraction Procedures for the Extraction of Organic Impurities from Seized MDMA Tablets. M.S. Forensic Science, August 2009.
14. Jamie M. Baernkopf. Association and Discrimination of Ignitable Liquids from Matrix Interferences using Chemometric Procedures. M.S. Forensic Science, June 2009.
13. Lisa M. LaGoo. Persistence of GSR in Decomposing Tissue and Blowfly Larvae. M.S. Forensic Science, May 2008.
12. Lucas J. Marshall. Association and Discrimination of Diesel Fuels using Chemometric Procedures for Forensic Arson Investigations. M.S. Forensic Science, May 2008.
11. Jennifer M. Froelich. Development of a Small-Scale Single-Tube Proteomics Approach for the Analysis of Protein Biomarkers from Biological Threat Agents. M.S. Forensic Science, April 2008.
10. Melissa S. Meaney. Separation and Quantitation of Nitrated Explosives using Thin-Layer Chromatography and Charge-Coupled Device Camera Imaging. M.S. Forensic Science, October 2007.
9. Gwynyth Scherperel. Electrospray Ionization Mass Spectrometry for the Detection and Characterization of Smokeless Powders. M.S. Forensic Science, August 2007.
8. Carl I.D. Newman. Microchip Separations of Alkaloids with UV-Absorbance Spectral Detection. M.S. Forensic Science, July 2007.
7. Heather M. Dotzauer. Optimization of Headspace-Solid Phase Microextraction for the Extraction of Organic Impurities in Seized Ecstasy Tablets. M.S. Forensic Science, June 2007.

**M.S. Thesis Committee Chair contd.**

6. Srividhya Kidambi. Analysis of Amphetamine and Methamphetamine by Surface-Enhanced Infrared Spectroscopy. M.S. Forensic Science, May 2007.
5. Luther S. Schaeffer. The Persistence of Gunshot Residue on Decomposing Tissue. M.S. Forensic Science, May 2007.
4. Agnieszka N. Steiner. Performance of the Reflected Ultraviolet Imaging System (RUVIS) in Visualizing Latent Fingerprints on Various Nonporous and Semiporous Surfaces. M.S. Forensic Science, May 2007.
3. Elizabeth A. McGaw. Determination of Trace Elemental Concentrations in Document Papers for Forensic Comparison using Inductively Coupled Plasma-Mass Spectrometry. M.S. Forensic Science, April 2007.
2. Kelly M. Greenough. Forensic Analysis of Cosmetic Face Powders. M.S. Forensic Science, April 2007.
1. Audrey N. Martin. The Application of Single Particle Aerosol Mass Spectrometry for the Detection and Identification of High Explosives and Chemical Warfare Agents. M.S. Forensic Science, November 2006.

**M.S. Thesis Committee Member**

9. Courtney Weatherbee. Ecology of Calliphoridae Larval Masses and Postmortem Colonization Estimate Variability. M.S. Entomology, 2016.
8. Amanda Rzotkiewicz. Understanding the Relationship Between the Human Microbiome and Urban Decay/Recovery Among Autopsied Adults in Detroit, Michigan. M.S. Criminal Justice, 2016.
7. James Hopkins. Forensic Soil Bacterial Profiling using 16S rRNA Gene Sequencing and Diverse Statistics. M.S. Forensic Science, 2014.
6. Scott Grammer. Analysis of DNA Obtained from Wireless Electronic Triggering Mechanisms used with Improvised Explosive Devices. M.S. Forensic Science, 2012.
5. Jade McDaniel. The Effects of Multiple Handlers on Development of DNA Profiles from Assemblers of Deflagrated Pipe Bombs. M.S. Forensic Science, 2012.
4. Alicya Orlando. The Recovery and Analysis of DNA from Fired Cartridge Casings. M.S. Forensic Science, 2012.
3. Stephen Gicale. The Effects of Cyanoacrylate Fuming on the Quantity and Quality of DNA Recovered from Deflagrated Pipe Bombs. M.S. Forensic Science, 2011.
2. Chadwick L. Douglass. Artificial Aging and the Effect on Adhesives and Backings of Office and Packaging Tapes. M.S. Forensic Science, July 2006.
1. Ellyn L. Schuette. Enhanced Latent Fingerprint Detection in Missing and Exploited Children Investigations. M.S. Forensic Science, August 2005.

### **Ph.D. Dissertation Committee Member**

5. Hannah Clause. Radionuclide Harvesting Capabilities at NSCL/FRIB. Ph.D. Chemistry, anticipated 2021.
  4. Briana Capistran. Creation of a Selective Interface using Metal Ion Oxidation State Toggling. Ph.D. Chemistry, anticipated 2021.
  3. Rebecca Boyea. Mechanism of Action of Drugs used in the Treatment of Multiple Sclerosis. Ph.D. Chemistry, anticipated 2021.
  2. John W. McIlroy. Kinetic Models for the Prediction of Weathering of Complex Mixtures on Natural Waters. Ph.D. Chemistry, September 2014.
  1. Melissa A. Bodnar Willard. Development and Application of a Statistical Approach to Establish Equivalence of Unabbreviated Mass Spectra. Ph.D. Chemistry, December 2012 (co-chair).
- 

### **TEACHING**

#### **Courses Taught at Michigan State University**

2005 – present	CJ819 Forensic Analysis of Drugs and Alcohol <i>(offered each fall, 4-5 students)</i>
2006 – present	CJ820 Forensic Chemistry and Trace Evidence <i>(offered each spring, 5-8 students)</i>
2010 – present	CJ809 Understanding Controlled Substances Analysis Section 735, Online course <i>(offered every spring, summer, and fall)</i>
2010 – present	CJ809 Understanding Trace Evidence Analysis Section 737, Online course <i>(offered online every spring, summer, and fall)</i>
Spring 2017	CEM 435 Analytical Laboratory <i>(Team-taught course, faculty mentor overseeing independent projects)</i>

#### **Courses Taught at Professional Meetings**

2015	<i>Methods for Statistical Evaluation of Evidence Comparisons</i> Taught with Dr. Victoria L. McGuffin and Dr. Melissa Willard Midwestern Association of Forensic Scientists 44 <sup>th</sup> Annual Fall Meeting, Mackinac Island, MI
2013	<i>Statistical Comparison of Mass Spectral Data</i> Midwestern Association of Forensic Scientists 42 <sup>nd</sup> Annual Fall Meeting, Dayton, OH

## CONFERENCE SYMPOSIA ORGANIZED AND SESSIONS CHAIRED

- 2017 *Innovations in the Analysis of Emerging Psychotropic and Synthetic Designer Drugs*  
Symposium organized at the 68<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL
- 2017 *Black Box and White Box Studies and Fingerprints*  
Session chaired at the 69<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, New Orleans, LA
- 2015 *Fire Debris and Explosives I*  
Session chaired at the American Society for Mass Spectrometry Sanibel Conference on Security and Forensic Applications of Mass Spectrometry, Clearwater Beach, FL
- 2014 *Explosions*  
Session chaired at the 66<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Seattle, WA
- 2013 *New and Emerging Analytical Technologies in Forensic Science*  
Symposium organized at the 64<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA
- 2013 *Ignitable Liquids and Fire Debris*  
Session chaired at the 65<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Washington, DC
- 2009 *Miscellaneous*  
Session chaired at the 61<sup>st</sup> American Academy of Forensic Sciences Annual Meeting, Denver, CO
- 2006 *Highlighting the Diversity of Mass Spectrometry for Forensic Applications*  
Symposium organized at the 33<sup>rd</sup> Federation of Analytical Chemistry and Spectroscopy Societies (now SciX) Meeting  
Lake Buena Vista, FL
-

## PRESENTATIONS

**Conference Presentations** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

80. \*†Alexandria L. Anstett, †Fanny Chu, David E. Alonso, A. Daniel Jones, and Ruth Waddell Smith. Mass Spectral Tools for Characterization of Synthetic Phenethylamines. Oral presentation at the 68<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL. March 2017.
79. †Alexandria L. Anstett, David E. Alonso, A. Daniel Jones, and Ruth Waddell Smith. Development of a Characterization Scheme for Emerging Synthetic Phenethylamines. Poster presentation at the 69<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, New Orleans, LA. February 2017.
78. \*Ruth Waddell Smith. Forensic Research at MSU. Oral presentation at the 72<sup>nd</sup> Annual Midland Section American Chemical Society Fall Scientific Meeting, Midland, MI. October 2016.
77. †Melissa Bodnar-Willard, Ruth Waddell Smith, and Victoria L. McGuffin. Frequentist Approach for Statistical Comparison of Mass Spectra. Oral presentation at the 45<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Branson, MO. October 2016.
76. \*†Kristen L. Reese, A. Daniel Jones, and Ruth Waddell Smith. Analysis and Characterization of Smokeless Powders using Multiplexed Collision-Induced Dissociation MS and Chemometric Procedures. Oral presentation at the SciX Conference, Minneapolis, MN. September 2016.
75. †Fanny Chu, A. Daniel Jones, and Ruth Waddell Smith. Strategies for Classification and Annotation of Novel Synthetic Designer Drugs. Poster presentation at the American Society for Mass Spectrometry Annual Meeting, San Antonio, TX. June 2016.
74. †Alexandria Anstett, †Fanny Chu, David E. Alonso, and Ruth Waddell Smith. Characterization of Synthetic Phenethylamines using High-Resolution GC-TOFMS and Mass Defect Filters. Oral presentation at the 67<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, GA. March 2016.
73. †Rebecca J. Brehe, †John W. McIlroy, Ruth Waddell Smith, and Victoria L. McGuffin. Mathematical Model to Predict Evaporation of Ignitable Liquids for Forensic Applications. Oral presentation at the 67<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Atlanta, GA. March 2016.
72. †Cynthia Kaeser, A. Daniel Jones, and Ruth Waddell Smith. Differentiation of Cathinone Isomers using High-Resolution Collision-Induced Dissociation Mass Spectrometry (CID-MS). Oral presentation at the 68<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Las Vegas, NV. February 2016.
71. †Alexandria Anstett, †Fanny Chu, and Ruth Waddell Smith. Characterization of Synthetic Phenethylamines using High-Resolution Mass Spectrometry. Oral presentation at the 68<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Las Vegas, NV. February 2016.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

70. †Rebecca J. Brehe, †John W. McIlroy, Ruth Waddell Smith, and Victoria L. McGuffin. Mathematically Modeling Chromatograms of Evaporated Liquids for Fire Debris Applications. Oral presentation at the 68<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Las Vegas, NV. February 2016.
69. †Trevor Curtis, John Buchweitz, and Ruth Waddell Smith. Elemental Composition of Tattoo Inks as an Identification Tool. Poster presentation at the 68<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Las Vegas, NV. February 2016.
68. †Kristen L. Reese, A. Daniel Jones, and Ruth Waddell Smith. Differentiation of Commercial Ammunition Sources of Unburned and Corresponding Burned Smokeless Powders based on Chemical Composition using Mass Spectrometry and Principal Components Analysis. Poster presentation at the 68<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Las Vegas, NV. February 2016.
67. \*†Melissa A. Bodnar-Willard, Ruth Waddell Smith, and Victoria L. McGuffin. Statistical Method for Comparison of Mass Spectra: Applications for the Identification of Controlled Substances. Oral presentation at the SciX Conference, Providence, RI. September 2015.
66. †Alexandria Anstett and Ruth Waddell Smith. Absolute and Kendrick Mass Defects for the Characterization of Synthetic Phenethylamines According to Structural Subclass. Poster presentation at the 44<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Mackinac Island, MI. September 2015.
65. †Trevor E. Curtis, John Buchweitz, and Ruth Waddell Smith. Elemental Analysis of Tattoo Inks for Color Differentiation. Poster presentation at the 44<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Mackinac Island, MI. September 2015.
64. †Fanny Chu and Ruth Waddell Smith. Mass Defect Filters for the Classification of Emerging Synthetic Designer Drug Analogs. Poster presentation at the 63<sup>rd</sup> American Society for Mass Spectrometry & Allied Topics Annual Meeting, St. Louis, MO. June 2015.
63. †Fanny Chu and Ruth Waddell Smith. Quantification of Controlled Substances in Simulated Samples using ATR-FTIR and Principal Components Regression. Oral presentation at the 67<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Orlando, FL. February 2015.
62. †Rebecca J. Brehe, †John W. McIlroy, Ruth Waddell Smith, and Victoria L. McGuffin. Mathematical Modeling of Evaporated Petroleum Distillate Standards. Poster presentation at the 67<sup>th</sup> American Academy of Forensic Sciences Annual Meeting, Orlando, FL. February 2015.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

61. \*†Fanny Chu and Ruth Waddell Smith. Mass Defect Filters for Classification of Synthetic Designer Drugs. Oral presentation at the American Society for Mass Spectrometry Sanibel Conference, Clearwater Beach, FL. January 2015.
60. †Fanny Chu and Ruth Waddell Smith. Development of Mass Defect Filters for the Classification of Synthetic Phenethylamines. Poster presentation at the 43<sup>rd</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, St. Paul, MN. October 2014.
59. †Rebecca Brehe, Victoria L. McGuffin, and Ruth Waddell Smith. Investigation of Factors Influencing Evaporation of Gasoline. Poster presentation at the 43<sup>rd</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, St. Paul, MN. October 2014.
58. \*†John W. McIlroy, Ruth Waddell Smith, and Victoria L. McGuffin. Evaluation of Data Pretreatment Procedures for Forensically Relevant Samples. Oral presentation at the SciX Conference, Reno, NV. September 2014.
57. †Jordyn L. Geiger, Victoria L. McGuffin, and Ruth Waddell Smith. Further Investigation of Principal Components Analysis for Identification of Ignitable Liquids in Fire Debris. Poster presentation at the 65<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL. March 2014.
56. Ruth Waddell Smith and †Andrew T. DeJarnette. Applications of Multivariate Statistical Procedures for the Identification of Controlled Substances. Oral presentation at the 66<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2014.
55. †Jordyn L. Geiger, Victoria L. McGuffin, and Ruth Waddell Smith. Classification Procedures for Identification of Ignitable Liquids in Fire Debris. Poster presentation at the 42<sup>nd</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Dayton, OH. September 2013.
54. †John W. McIlroy, Victoria L. McGuffin, and Ruth Waddell Smith. Applications of Multivariate Statistics in Forensic Science. Oral presentation at the 64<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Philadelphia, PA. March 2013.
53. †Andrew T. DeJarnette, Victoria L. McGuffin, and Ruth Waddell Smith. Investigation of Soft Independent Modeling of Class Analogy for the Classification of Ignitable Liquids in Simulated Fire Debris. Poster presentation at the 64<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Philadelphia, PA. March 2013.
52. †Melissa A. Bodnar Willard, Victoria L. McGuffin, and Ruth Waddell Smith. Statistical Comparison of Mass Spectral Data in the Identification of Amphetamine-Type Stimulants. Oral presentation at the 65<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington D.C. February 2013.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

51. †Andrew T. DeJarnette, Victoria L. McGuffin, and Ruth Waddell Smith. Principal Components Analysis and Hierarchical Cluster Analysis for the Identification of Ignitable Liquids in Simulated Fire Debris. Oral presentation at the 65<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington D.C. February 2013.
50. †Emily G. Riddell and Ruth Waddell Smith. Characterization and Differentiation of Document Papers based on Element Profiles. Oral presentation at the 65<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington D.C. February 2013.
49. †Seth R. Hogg, Brian C. Hunter, and Ruth Waddell Smith. Analysis of Lead-Free Ammunition by Scanning Electron Microscopy using Energy Dispersive X-Ray Spectroscopy and Discrimination of Samples using Multivariate Statistical Methods. Oral presentation at the 65<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington D.C. February 2013.
48. †Emily G. Riddell and Ruth Waddell Smith. Elemental Analysis of Document Papers using Inductively Coupled Plasma Optical Emission Spectroscopy. Oral presentation at the 41<sup>st</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Milwaukee, WI. September 2012.
47. †Andrew T. DeJarnette, Victoria L. McGuffin, and Ruth Waddell Smith. Effect of Extraction Time and Temperature on Extraction of Ignitable Liquids from Fire Debris. Poster presentation at the 41<sup>st</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Milwaukee, WI. September 2012.
46. †Kaitlin R. Prather, †Suzanne E. Towner, Victoria L. McGuffin, and Ruth Waddell Smith. Investigating the Use of Multivariate Statistical Procedures in Fire Debris Analysis. Oral presentation at the presentation at the 63<sup>rd</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, FL. March 2012.
45. †Johanna M. Smeekens, †John W. McIlroy, and Ruth Waddell Smith. Investigating the Extraction of Diesel Fuel from Water for Fuel Spill Remediation. Poster presentation at the presentation at the 63<sup>rd</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, FL. March 2012.
44. Monica L. Bugeja, Victoria L. McGuffin, and Ruth Waddell Smith. Objective †Discrimination of *Salvia divinorum* from related *Salvia* species using Chromatographic Techniques and Multivariate Statistical Procedures. Oral presentation at the 64<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Atlanta, GA. February 2012.
43. †Christine E. Hay, Brian C. Hunter, and Ruth Waddell Smith. Elemental Analysis of Gunshot Residue to Differentiate Bullet Type and Firing Distance. Oral presentation at the 64<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Atlanta, GA. February 2012.



**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

42. †Karlie M. McManaman and Ruth Waddell Smith. Differentiation of MDMA Exhibits using Liquid-Liquid Extraction, Headspace Solid Phase Microextraction, and Gas Chromatography-Mass Spectrometry. Oral presentation at the 64<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Atlanta, GA. February 2012.
41. †Suzanne E. Towner, †Kaitlin R. Prather, Victoria L. McGuffin, and Ruth Waddell Smith. The Association and Discrimination of Gasoline and Lighter Fluid Using Multivariate Statistical Procedures in the Presence of Evaporation, Thermal Degradation, and Matrix Interferences from Surface-Treated Wood. Oral presentation at the 64<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Atlanta, GA. February 2012.
40. †Suzanne E. Towner, †Kaitlin R. Prather, Victoria L. McGuffin, and Ruth Waddell Smith. Effect of Evaporation, Matrix Interferences, and Thermal Degradation on the Association and Discrimination of Ignitable Liquids Extracted from High Density Polyethylene. Poster presentation at the 40<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Chicago, IL. September 2011.
39. †Karlie M. McManaman and Ruth Waddell Smith. Comparison of Gas Chromatography Temperature Programs in MDMA Profiling. Poster presentation at the 40<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Chicago, IL. September 2011.
38. †John W. McIlroy, Gavin E. Reid, and Ruth Waddell Smith. Lipid Profiling of Decomposed Tissue by Nano-Electrospray Ionization Tandem Mass Spectrometry for Postmortem Interval Determination. Oral presentation at the 42<sup>nd</sup> Central Regional Meeting of the American Chemical Society, Indianapolis, IN. June 2011.
37. †Kaitlin R. Prather, Victoria L. McGuffin, and Ruth Waddell Smith. Using Multivariate Statistical Procedures to Identify Ignitable Liquid Residues in the Presence of Interferences. Oral presentation at the 42<sup>nd</sup> Central Regional Meeting of the American Chemical Society, Indianapolis, IN. June 2011.
36. †Monica L. Bugeja, †Melissa A. Bodnar Willard, Victoria L. McGuffin, and Ruth Waddell Smith. Discrimination of *Salvia divinorum* from Related *Salvia* Species using Chromatographic Techniques and Chemometric Procedures. Oral presentation at the 42<sup>nd</sup> Central Regional Meeting of the American Chemical Society, Indianapolis, IN. June 2011.
35. †Kaitlin R. Prather, Victoria L. McGuffin, and Ruth Waddell Smith. Effects of Matrix Interference, Weathering, and Thermal Degradation on the Association of Ignitable Liquid Residues to Neat Ignitable Liquids. Oral presentation at the 63<sup>rd</sup> Annual Meeting of the American Academy of Forensic Sciences, Chicago, IL. February 2011.
34. †Monica L. Bugeja, †Melissa Bodnar Willard, Victoria L. McGuffin, and Ruth Waddell Smith. Development of a Chemical Fingerprint for *Salvia divinorum* using Liquid Chromatography-Mass Spectrometry for Association and Discrimination from Related *Salvia* Species. Poster presentation at the 63<sup>rd</sup> Annual Meeting of the American Academy of Forensic Sciences, Chicago, IL. February 2011.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

33. †Emily G. Riddell, †Christine E. Hay, †Johanna M. Smeekens, and Ruth Waddell Smith. Multivariate Statistical Procedures for the Analysis of Questioned Documents. Poster presentation at the 63<sup>rd</sup> Annual Meeting of the American Academy of Forensic Sciences, Chicago, IL. February 2011.
32. †Kaitlin R. Prather, Victoria L. McGuffin, and Ruth Waddell Smith. Effects of Matrix Interference and Weathering on the Association of Ignitable Liquid Residues to Neat Ignitable Liquids. Poster presentation at the 39<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Kansas City, MO. October 2010.
31. †Monica L. Bugeja, †Melissa A. Bodnar Willard, Victoria L. McGuffin, and Ruth Waddell Smith. Comparison of Methods for the Extraction of Volatile Compounds from *Salvia divinorum*. Poster presentation at the 39<sup>th</sup> Annual Meeting of the Midwestern Association of Forensic Scientists, Kansas City, MO. October 2010.
30. †Melissa A. Bodnar, Victoria L. McGuffin, and Ruth Waddell Smith. Forensic Analysis of *Salvia divinorum* and Related *Salvia* Species Using Chemometric Procedures. Oral presentation at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2010.
29. †Ruth N. Udey, Brian C. Hunter, and Ruth Waddell Smith. Differentiation of Bullet Type Based on Analysis of Gunshot Residue Using Inductively Coupled Plasma-Mass Spectrometry. Oral presentation at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2010.
28. †John W. McIlroy and Ruth Waddell Smith. Use of Volatile Organic Compounds and Chemometric Procedures to Determine Postmortem Interval. Poster presentation at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2010.
27. †Emily G. Riddell, †John W. McIlroy, Victoria L. McGuffin, and Ruth Waddell Smith. Effect of Pulsed Pressure Injection on the Analysis of Gasoline using Gas Chromatography-Mass Spectrometry and Chemometric Procedures. Poster presentation at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2010.
26. †Tiffany P. Van De Mark, †Melissa A. Bodnar, Victoria L. McGuffin, and Ruth Waddell Smith. Effects of Matrix Interferences on the Identification of Mixed Ignitable Liquids in Fire Debris Using Chemometric Procedures. Poster presentation at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA. February 2010.
25. †Patricia J. Joiner and Ruth Waddell Smith. Comparison of Extraction Procedures for Organic Impurity Profiling of Seized MDMA. Oral presentation at the Joint Meeting of the Southwestern, Southern, Midwestern, and Mid-Atlantic Associations of Forensic Scientists, Orlando, FL. October 2009.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

24. †Tiffany P. Van De Mark, †Melissa A. Bodnar, Victoria L. McGuffin, and Ruth Waddell Smith. Association of Evaporated Ignitable Liquids to their Neat Counterparts using Pearson Product Moment Correlation Coefficients and Principal Components Analysis. Poster Presentation at the Joint Meeting of the Southwestern, Southern, Midwestern, and Mid-Atlantic Associations of Forensic Scientists, Orlando, FL. October 2009.
23. \*†John W. McIlroy, †Jamie M. Baerncof, Ruth Waddell Smith, A. Daniel Jones, and Victoria L. McGuffin. Association of Evaporated Ignitable Liquids Using Gas Chromatography-Mass Spectrometry and Chemometric Procedures. Oral presentation at the Central Regional Meeting of the American Chemical Society, Cleveland, OH. May 2009.
22. \*†Patricia J. Joiner and Ruth Waddell Smith. Optimization of a microwave-assisted extraction (MAE) procedure for the extraction of organic impurities from seized MDMA tablets. Oral presentation at the Central Regional Meeting of the American Chemical Society, Cleveland, OH. May 2009.
21. †John W. McIlroy, †Lucas J. Marshall, Ruth Waddell Smith, Victoria L. McGuffin. Pretreatment of Gas Chromatography-Mass Spectrometry Data prior to Chemometric Analysis. Poster presentation at the 60<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL. March 2009.
20. †Melissa A. Bodnar, Ruth Waddell Smith, and Victoria L. McGuffin. Comparison of Gas Chromatography-Mass Spectrometry and Liquid Chromatography-Mass Spectrometry for Discrimination of Salvia Divinorum from Related Salvia Species using Chemometric Procedures. Poster presentation at the 60<sup>th</sup> Annual Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL. March 2009.
19. †Jamie M. Baerncof, Victoria L. McGuffin, and Ruth Waddell Smith. Discrimination of Ignitable Liquids from Burned Matrix Interferences using Chemometric Procedures. Oral presentation at the 61<sup>st</sup> Annual Meeting of the American Academy of Forensic Sciences, Denver, CO. February 2009.
18. †Patricia J. Joiner and Ruth Waddell Smith. Optimization of a Microwave-Assisted Extraction/Headspace Solid Phase Microextraction (MAE/HS-SPME) Procedure for Organic Impurity Profiling of Seized MDMA. Poster presentation at the 61<sup>st</sup> Annual Meeting of the American Academy of Forensic Sciences, Denver, CO. February 2009.
17. \*†Lisa LaGoo, Brian C. Hunter, David W. Szymanski, Ruth Waddell Smith. Chemical Identification of Gunshot Residue in Decomposing Tissue and Blowfly Larvae Samples using ICP-MS. Oral presentation at the Anachem Symposium, Livonia, MI. October 2008.
16. †Jamie M. Baerncof, Victoria L. McGuffin, and Ruth Waddell Smith. Effect of GC Temperature Program on the Discrimination of Diesel Samples for Forensic Arson Investigations. Oral presentation at the Fall Meeting of the Midwestern Association of Forensic Scientists, Des Moines, IA. October 2008.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

15. †Patricia J. Joiner and Ruth Waddell Smith. Development of a Microwave-Assisted Extraction/Headspace Solid Phase Microextraction (MAE/HS-SPME) Procedure for Organic Impurity Profiling of Seized MDMA Tablets. Poster presentation at the Fall Meeting of the Midwestern Association of Forensic Scientists, Des Moines, IA. October 2008.
14. †Lisa LaGoo, Brian C. Hunter, David W. Szymanski, and Ruth Waddell Smith. Detection of Gunshot Residue from Decomposing Tissue Samples and Blowfly Larvae using ICP-MS. Poster presentation at the 35<sup>th</sup> Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Reno, NV. September 2008.
13. †Sarah C. Meisinger, †Patricia J. Joiner, and Ruth Waddell Smith. Development of a Microwave-Assisted Extraction Procedure for Organic Impurity Profiling of Seized MDMA Tablets. Poster presentation at the 236<sup>th</sup> American Chemical Society National Meeting and Exhibition, Philadelphia, PA. August 2008.
12. †Lucas J. Marshall, †Amber M. Hupp, Ruth Waddell Smith, and Victoria L. McGuffin. Association and Discrimination of Diesel Fuels using Chemometric Procedures for Fire Debris Analysis in Forensic Arson Investigations. Oral presentation at the 60<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington DC. February 2008.
11. †Lisa LaGoo, David W. Szymanski, and Ruth Waddell Smith. Correlation of GSR Persistence in Decomposing Tissue to GSR Persistence in Blowfly Larvae. Poster presentation at the 60<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington DC. February 2008.
10. †Sarah C. Meisinger and Ruth Waddell Smith. Comparison of Extraction Procedures for Organic Impurity Profiling of Seized MDMA Tablets. Poster presentation at the 60<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, Washington DC. February 2008.
9. †Lucas J. Marshall, †Amber M. Hupp, Ruth J.H. Waddell, and Victoria L. McGuffin. Association and Discrimination of Diesel Fuels using Chemometric Procedures for Arson Investigations. Poster presentation at the Fall Meeting of the Midwestern Association of Forensic Scientists, Traverse City, MI. September 2007.
8. †Sarah C. Meisinger and Ruth J.H. Waddell. Optimization of Headspace-Solid Phase Microextraction (HS-SPME) for Organic Impurity Profiling of Seized MDMA Tablets. Poster presentation at the Fall Meeting of the Midwestern Association of Forensic Scientists, Traverse City, MI. September 2007.
7. †Amber M. Hupp, †Dahlia I. Campbell, †Lucas J. Marshall, Ruth J.H. Waddell, and Victoria L. McGuffin. Chemical Fingerprinting of Diesel Fuels using GC-MS and Chemometric Methods for Forensic Analysis. Oral presentation at the 58<sup>th</sup> Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Chicago, IL. March 2007.

**Conference Presentations contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

6. †Agnieszka Steiner and Ruth J.H. Waddell. Performance of the Reflected Ultraviolet Imaging System (RUVIS) in Visualizing Latent Fingerprints on Various Non-porous and Semi-porous Surfaces. Poster presentation at the 59<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, San Antonio, TX. February 2007.
5. †Luther S. Schaeffer and Ruth J.H. Waddell. Persistence of Gunshot Residue in Decomposing Tissue. Poster presentation at the 59<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, San Antonio, TX. February 2007.
4. †Heather M. Dotzauer and Ruth J.H. Waddell. Optimization of Solid-Phase Microextraction-GC-MS for the Extraction of Organic Impurities in Seized MDMA. Poster presentation at the 59<sup>th</sup> Annual Meeting of the American Academy of Forensic Sciences, San Antonio, TX. February 2007.
3. \*Ruth J.H. Waddell, †Dahlia I. Campbell, †Amber M. Hupp, Victoria L. McGuffin. Forensic Discrimination of Diesel Samples. Oral presentation at the 33<sup>rd</sup> Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Lake Buena Vista, Florida, September 2006.
2. Ruth Waddell, Don E. Dale, and Matthew Monagle. Thermal Desorption of HMX from a PTFE Wipe using Gas Chromatography with Electron-Capture Detection using a Dual Column-Dual Detector Configuration. Poster presentation at the 229<sup>th</sup> American Chemical Society Annual Meeting, San Diego, California, March 2005.
1. Ruth Waddell, Cris L. Lewis, and D. Christian Hassell. Chemical Speciation of Hydrocarbon Mixtures using Gas Chromatography Time-of-Flight Mass Spectrometry with a Pulsed Glow Discharge Ion Source. Oral presentation at the 30<sup>th</sup> Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies, Fort Lauderdale, Florida, October 2003.

**Non-Conference Presentations and Invited Lectures** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

19. \*Ruth Waddell Smith. Forensic Chemistry. Presented at Hillsdale College, Hillsdale, MI. March 2017.
18. Ruth Waddell Smith. Forensic Chemistry. Lecture in CEM 425 Chemistry Communication, Department of Chemistry, Michigan State University, East Lansing, MI. September 2016.
17. †Christine E. Hay, Brian C. Hunter, and Ruth Waddell Smith. Elemental Analysis of Gunshot Residue to Differentiate Bullet Type and Firing Distance. Presented at Andrews University, Berrien Springs, MI. October 2014.
16. Ruth Waddell Smith. Multivariate Statistical Procedures in Fire Debris Analysis. Presented at Adrian College, Adrian, MI. October 2012.

**Non-Conference Presentations and Invited Lectures contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

15. †Johanna M. Smeekens, †John W. McIlroy, and Ruth Waddell Smith. Investigating the Efficiency of Extracting Diesel Fuel from Water using Univariate and Multivariate Calibration Procedures. Poster presentation at the University Undergraduate Research and Arts Forum, Michigan State University, East Lansing, MI. April 2012.
14. †Karlie M. McManaman and Ruth Waddell Smith. Comparison of Analytical Methods for Ecstasy Profiling. Poster presentation at the 4<sup>th</sup> Annual Graduate Academic Conference, Michigan State University, East Lansing, MI. March 2012.
13. †Suzanne E. Towner, Victoria L. McGuffin, and Ruth Waddell Smith. Identification of Gasoline, Kerosene, and Lighter Fluid in Simulated Fire Debris Samples of Surface-Treated Wood Flooring. Poster presentation at the 4<sup>th</sup> Annual Graduate Academic Conference, Michigan State University, East Lansing, MI. March 2012.
12. Ruth Waddell Smith. Trace Evidence. Lecture at Crime Scene Investigation Summer Camp, Michigan State University, East Lansing, MI. June 2010.
11. Ruth Waddell Smith. Are University Forensic Science Programs Meeting the Needs of Forensic Science Laboratories? Presented at the Forensic Science Education Forum, IUPUI, Indianapolis, IN. June 2010.
10. †Emily G. Riddell, †John W. McIlroy, Victoria L. McGuffin, and Ruth Waddell Smith. Effect of Pulsed Pressure Injection on the Analysis of Gasoline using Gas Chromatography-Mass Spectrometry and Chemometric Procedures. Poster presentation at the University Undergraduate Research and Arts Forum, Michigan State University, East Lansing, MI. April 2010.
9. Ruth Waddell Smith. Chromatography and Mass Spectrometry: Analysis of Controlled Substances and Fire Debris. Lecture in LAW 623F Trial Practice Institute: Forensic Science, College of Law, Michigan State University, East Lansing, MI. September 2009.
8. Ruth Waddell Smith. Chromatography and Mass Spectrometry: Theory and Instrumentation. Lecture in LAW 623F Trial Practice Institute: Forensic Science, College of Law, Michigan State University, East Lansing, MI. September 2009.
7. Ruth Waddell Smith. Forensic Science at Michigan State University. Presented at the Crime Scene Investigation Program, Gifted and Talented Education, Honors College, Michigan State University, East Lansing, MI. June 2009.
6. Ruth Waddell Smith. Trace Evidence. Lecture at the Crime Scene Investigation Program, Gifted and Talented Education, Honors College, Michigan State University, East Lansing, MI. June 2009.
5. Ruth Waddell Smith. Chromatography and Mass Spectrometry-Theory and Instrumentation. Lecture in LAW 623F Trial Practice Institute: Forensic Science. September 2008.

**Non-Conference Presentations and Invited Lectures contd.** (\*Denotes invited presentation; †denotes graduate student; presenter underlined)

4. Ruth Waddell Smith. Chromatography and Mass Spectrometry-Applications in Controlled Substance and Fire Debris Analysis. Lecture in LAW 623F Trial Practice Institute: Forensic Science. September 2008.
3. Ruth Waddell Smith. Chromatography. Presented at the Forensic Science Educators Conference, Michigan State University, East Lansing, MI. August 2008.
2. David W. Szymanski and Ruth Waddell Smith. Glass, Paint and Soil Evidence. Presented at the Forensic Science Educators Conference, Michigan State University, East Lansing, MI. August 2008.
1. Ruth Waddell Smith. Overview of the Forensic Science Program at Michigan State University. Presented at the Crime Scene Investigation Program, Gifted and Talented Education, Honors College, Michigan State University, East Lansing, MI. June 2008.