



## John V. Goodpaster, Ph.D.

Department of Chemistry and Chemical Biology  
Forensic and Investigative Sciences (FIS) Program  
Indiana University Purdue University Indianapolis (IUPUI)  
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### EDUCATION

B.A., Chemistry (Certified by the American Chemical Society)  
Gustavus Adolphus College, St. Peter, MN (1995)  
Graduated *summa cum laude*

M.S., Criminal Justice (Specialization in Forensic Science)  
Michigan State University, East Lansing, MI (2000)  
Advisor: Jay A. Siegel, Ph.D.  
Thesis: *Forensic Analysis of Soil Based on Its Organic Content*

Ph.D., Analytical Chemistry  
Michigan State University, East Lansing, MI (2000)  
Advisor: Victoria L. McGuffin, Ph.D.  
Dissertation: *Fundamental Studies and Analytical Applications of Selective Fluorescence Quenching*

National Research Council Post-Doctoral Associate  
National Institute of Standards and Technology (NIST), Gaithersburg, MD (2001-2002)  
Advisor: Bruce A. Benner, Ph.D.  
Project: *Chemical Analysis of Hair Surface Components*

### ACADEMIC APPOINTMENTS

8/07 – present *Assistant Professor*  
Department of Chemistry and Chemical Biology  
Indiana University Purdue University Indianapolis (IUPUI)  
Indianapolis, IN

8/11 – present *Director*  
Forensic and Investigative Sciences (FIS) Program  
Indiana University Purdue University Indianapolis (IUPUI)  
Indianapolis, IN

## **OTHER APPOINTMENTS AND PROFESSIONAL CONSULTANTSHIPS**

8/02 – 7/07     *Forensic Chemist*  
Forensic Science Laboratory - Washington  
Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF)  
Ammendale, MD

1/08 – present   *Forensic Consultant*  
Goodpaster Forensic Consulting, LLC  
Zionsville, IN

## **PROFESSIONAL ORGANIZATIONS**

American Chemical Society (ACS), 1995 – present  
American Academy of Forensic Sciences (AAFS), 1996 – present  
Midwestern Association of Forensic Scientists (MAFS), 2007 – present

## **HONORS AND AWARDS**

National Merit Scholarship (1991 – 1995)  
ACS Division of Analytical Chemistry Undergraduate Award (1994)  
FBI Honors Internship (1994)  
Phi Beta Kappa (1994)  
National Science Foundation Graduate Research Fellowship (1996 – 1999)  
American Society of Crime Laboratory Directors Scholarship (1996)  
Kenan Award Symposium (1998)  
ACS Division of Analytical Chemistry Graduate Fellowship (1999 – 2000)  
United States Department of Commerce Certificate of Appreciation (2002)  
United States Department of Treasury Certificate of Award (2003)  
Gustavus Adolphus College First Decade Award Nominee (2005)

## **GRANTS AND CONTRACTS**

1. “Causes, Effects and Mitigation of the Microbial Degradation of Ignitable Liquids”, Research Support Funds Grant, Office of Research and Sponsored Programs, IUPUI, 8/08 – 8/09, \$35,000, PI.
2. “Evaluation of the Odor Compounds Sensed by Explosive-Detecting Canines”, Technical Support Working Group, Combating Terrorism Technical Support Office, Department of Defense, 4/09 – 11/10, \$477,964, PI.
3. Matching Funds for “Evaluation of the Odor Compounds Sensed by Explosive-Detecting Canines”, Venture Fund, IUPUI Solution Center, 9/09 – 9/10, \$5,000, PI.

4. "Discrimination of Dyed Cotton Fibers Based on UV-visible Microspectrophotometry and Multivariate Statistical Analysis", Midwest Forensics Resource Center, 1/10 – 9/10, \$55,000, PI.
5. "Development of a Sampling System to Stabilize Ignitable Liquid Residues in Fire Debris", 10/10 – 10/12, \$239,025, PI.
6. "Evaluation of Statistical Measures for Fiber Comparisons: Interlaboratory Studies and Forensic Databases", National Institute of Justice, 10/10 – 10/12, \$139,848 (\$489,049 total), co-PI.
7. "Research and Evaluation of Pseudo-Explosive Training Aids", Combating Terrorism Technical Support Office, Department of Defense, 8/11 – 8/12, \$361,023, PI.

### TEACHING ASSIGNMENTS

Term	Course
Fall 2007	FIS 401: Forensic Chemistry I*
Spring 2008	FIS 206: Concepts in Forensic Science II*
	FIS 404: Forensic Chemistry II*
Fall 2008	CHEM 696: Chemical Analysis of Alcohol and Drugs (Lecture) <sup>†</sup>
	CHEM 696: Chemical Analysis of Alcohol and Drugs (Lab) <sup>†</sup>
Spring 2009	CHEM 696: Instrumental Analysis of Trace Evidence (Lecture) <sup>‡</sup>
	CHEM 696: Instrumental Analysis of Trace Evidence (Lab) <sup>‡</sup>
Fall 2009, Fall 2010, Fall 2011	FIS 511: Forensic Chemistry I (Lecture) <sup>†</sup>
	FIS 511: Forensic Chemistry I (Lab) <sup>†</sup>
Spring 2010, Spring 2011	FIS 512: Forensic Chemistry II (Lecture) <sup>‡</sup>
	FIS 512: Forensic Chemistry II (Lab) <sup>‡</sup>

\* Team taught

<sup>†</sup> Newly developed in 2008, this course focuses on the analysis and identification of commonly abused chemicals such as ethanol, controlled substances and prescription drugs. The history, legal issues, synthesis, chemical/physical properties, and laboratory analysis of these materials are discussed. A separate laboratory section is offered in which students complete practical exercises utilizing spectroscopy,

chromatography and mass spectrometry that reflect common practice in forensic science laboratories.

‡ Newly developed in 2009, this course focuses on the use of instrumental techniques to analyze trace evidence types such as ink, fibers, paint, adhesives, tape, ignitable liquids, and explosives. A separate lab section includes practical laboratory exercises utilizing spectroscopy, chromatography and mass spectrometry that reflect common practice in forensic science laboratories.

## **PROFESSIONAL SERVICE**

Guest Editor, "Forensic Analysis", *Analytical and Bioanalytical Chemistry* (2003)

Guest Editor, "Explosives Analysis", *Analytical and Bioanalytical Chemistry* (2009)

Peer Reviewer, *Journal of Forensic Sciences* (Fall 2007 – present)

Peer Reviewer, *Analytical and Bioanalytical Chemistry* (Fall 2007 – present)

Peer Reviewer, *Applied Spectroscopy* (Fall 2009 – present)

Peer Reviewer, *Rapid Communications in Mass Spectrometry* (Fall 2009 – present)

## **UNIVERSITY SERVICE**

Undergraduate Teaching Committee

Department of Chemistry and Chemical Biology (Fall 2007 – Spring 2009)

Assessment Committee

Purdue School of Science (Fall 2007 – Spring 2009)

Graduate Education Committee

Purdue School of Science (Fall 2009 – present)

## **GRADUATE ADVISEES**

1. Elisa Liszewski (M.S. Forensic Science, 2010)
2. Erica Lotspeich (M.S. Forensic Science, 2010)
3. Cheryl Szudlarek (M.S. Forensic Science)
4. Kelley Kitts (M.S. Forensic Science)
5. Dee Ann Turner (Ph.D. Chemistry)
6. Christina Rainey (Ph.D. Chemistry)

## **GRADUATE COMMITTEES**

1. Julie Barrett (M.S. Chemistry, 2008)
2. Lilyvet Rivas (M.S. Chemistry, 2008)
3. Alexandra Mendlein (M.S. Forensic and Investigative Sciences, 2011)

## UNDERGRADUATE RESEARCH STUDENTS

1. Nicholas Estrada
2. Brandon Kocher
3. Sara Cooper
4. Jennifer Behzadi
5. Samantha Weatherall
6. Benjamin Routon
7. Emily Smith
8. Katiana Whitaker
9. Suzanne Hakeem
10. Michelle Jordan
11. Neoshia Roemer
12. Justyne Kondos
13. Vincent Herring
14. Sean Campbell
15. Jason Hull (M.S. Student)
16. John Lawrence
17. Kevin Line (HS Student/Project SEED)
18. Josh Cummins
19. Alejandra Flores
20. Paige Conder
21. Aaron Todd
22. Nicolas Strange

## OTHER PROFESSIONAL ACTIVITIES

### EXTERNAL TRAINING PROVIDED

“Explosives: Synthesis, Properties and Evidence” for the Indiana State Police Bomb Squad, Muscatatuck Urban Training Center, Butlerville, IN (9/20/07)

“Laboratory Analysis of Explosives Evidence”, for *State and Local Post-Blast Investigation*, sponsored by the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), Naval Surface Weapons Center, Crane Division, Crane, IN (10/24/07)

“Putting the Pipe Back in Pipe Bomb” and “Instrumental Analysis of Low Explosives” for *Analysis of Low Explosives*, sponsored by the Midwest Forensics Resource Center, East Lansing, MI (6/25/08)

Coordinated presentation and exhibit on the clandestine synthesis of peroxide explosives for an FBI-sponsored event on Weapons of Mass Destruction held at Raytheon, Indianapolis, IN (8/13-14/08)

“Putting the Pipe Back in Pipe Bomb” and “IUPUI Pipe Bomb Study” for the Indiana State Police Bomb Squad, Pendleton, IN (11/12/08)

“The Use of Multivariate Statistics in Trace Evidence Investigations” at the *National Institute of Justice Trace Evidence Symposium*, Clearwater Beach, FL (8/4/09)

“Putting the Pipe Back in Pipe Bomb” and “IUPUI Pipe Bomb Study” for the Indiana State Police Bomb Squad, Muscatatuck Urban Training Center, Butlerville, IN (10/1/09)

“Chemometrics for Forensic Scientists: The Good, the Bad, and the Misleading” at the 62<sup>nd</sup> Annual Meeting of the American Academy of Forensic Sciences, Seattle, WA (2/23/10)

“Explosions and Explosives” for the Indianapolis Fire Department, Fire Investigation Section, Indianapolis, IN (5/18/10)

“Applications of Statistics to the Analysis of Alcohol and Drugs” and “Probability-Based Sampling Methods” for the Indiana State Police Laboratory, Indianapolis, IN (5/19/10)

“Pipe Bombs” for the Indianapolis Fire Department, Fire Investigation Section, Indianapolis, IN (6/22/10)

### COURTROOM EXPERIENCE

The People of the State of New York v. Sammie Boyd  
County Court, County of Erie, Buffalo, NY (5/21/04)

United States of America v. Andre Henry  
United States District Court, Eastern District of Pennsylvania (2/15/07)

United States of America v. Daniel Wayne Osbourne  
United States District Court, District of Montana (2/26/07)

United States of America v. Barry Fillman  
United States District Court, District of Kansas (4/18/07)

### **PEER-REVIEWED PUBLICATIONS**

1. J.V. Goodpaster, J.F. Harrison, V.L. McGuffin; “Ab Initio Study of Polycyclic Aromatic Hydrocarbons in Their Ground and Excited States,” *J. Phys. Chem. A* 102, 3372-3381 (1998).
2. J.V. Goodpaster, V.L. McGuffin; “Rapid and Accurate Determination of Stern-Volmer Quenching Constants,” *Appl. Spectrosc.* 53, 1000-1007 (1999).
3. J.V. Goodpaster, V.L. McGuffin; “Selective Fluorescence Quenching of Polycyclic Aromatic Compounds by Aliphatic Amines,” *Anal. Chem.* 72, 1072-1077 (2000).
4. J.V. Goodpaster, V.L. McGuffin; “Fluorescence Quenching as a Novel Indirect Detection Method for Nitrated Explosives,” *Anal. Chem.* 73, 2004-2011 (2001).
5. J.V. Goodpaster, V.L. McGuffin; “Separation of Nitramine and Nitroaromatic Explosives by Capillary Liquid Chromatography,” *J. Liq. Chromatogr. Relat. Technol.* 24, 1965-1978 (2001).
6. J.V. Goodpaster, S.B. Howerton, V.L. McGuffin; “Forensic Analysis of Commercial Petroleum Products Using Selective Fluorescence Quenching,” *J. Forensic Sci.* 46, 1358-1371 (2001).

7. S.B. Howerton, J.V. Goodpaster, V.L. McGuffin; "Characterization of Polycyclic Aromatic Hydrocarbons in Environmental Samples by Selective Fluorescence Quenching," *Anal. Chim. Acta* 459, 61-73 (2002).
8. J.V. Goodpaster, J.F. Harrison, V.L. McGuffin; "Ab Initio Study of Selective Fluorescence Quenching of Polycyclic Aromatic Hydrocarbons," *J. Phys. Chem. A*, 106, 10645-10654 (2002).
9. J.V. Goodpaster, J.J. Bishop, B.A. Benner, Jr.; "Forensic Analysis of Hair Surface Components Using Off-Line Extraction and Large Volume Injection," *J. Sep. Sci.*, 26, 137-141 (2003).
10. J.V. Goodpaster, B.C. Drumheller, B.A. Benner, Jr.; "Evaluation of Extraction Techniques for the Forensic Analysis of Human Scalp Hair Using Gas Chromatography/Mass Spectrometry (GC/MS)," *J. Forensic Sci.*, 48, 299-306 (2003).
11. B.A. Benner, Jr., J.V. Goodpaster, J.A. DeGrasse, L.A. Tully, B.C. Levin; "Characterization of Surface Organic Components of Human Hair by On-Line Supercritical Fluid Extraction - Gas Chromatography-Mass Spectrometry: A Feasibility Study and Comparison with Human Identification Using Mitochondrial DNA Sequences," *J. Forensic Sci.*, 48, 554-563 (2003).
12. J.V. Goodpaster, R.O. Keto; "Identification of Ascorbic Acid and Its Degradation Products in Black Powder Substitutes," *J. Forensic Sci.*, 49, 523-528 (2004).
13. J.V. Goodpaster, A.B. Sturdevant, K.L. Andrews, L. Brun-Conti; "Identification and Comparison of Electrical Tapes Using Instrumental and Statistical Techniques: I. Microscopic Surface Texture and Elemental Composition," *J. Forensic Sci.*, 52, 610-629 (2007).
14. J.V. Goodpaster, A.B. Sturdevant, K.L. Andrews, E.M. Briley, L. Brun-Conti; "Identification and Comparison of Electrical Tapes Using Instrumental and Statistical Techniques: II. Organic Composition of the Tape Backing and Adhesive," *J. Forensic Sci.* 54, 328-338 (2009).
15. D.A. Turner, J.V. Goodpaster; "Effects of Microbial Degradation on Ignitable Liquids in Soil," *Anal. Bioanal. Chem.*, 394, 363-371 (2009).
16. J.V. Goodpaster, E.A. Liszewski; "Forensic Analysis of Dyed Textile Fibers," *Anal. Bioanal. Chem.*, 394, 2009-2018 (2009).
17. J.A. Barrett, J.A. Siegel, J.V. Goodpaster; "Forensic Discrimination of Dyed Hair Color: I. UV-visible microspectrophotometry," *J. Forensic Sci.*, 55, 323-333 (2010).
18. E.A. Liszewski, S. Lewis, J. Siegel, J.V. Goodpaster, "Characterization of Automotive Paint Clear Coats by Ultraviolet Absorption Microspectrophotometry with Subsequent Chemometric Analysis," *Appl. Spectrosc*, 64, 1122-1125 (2010).
19. B.J. Routon, B.B. Kocher, J.V. Goodpaster "Discriminating Hodgdon Pyrodex and Triple Seven Using Gas Chromatography-Mass Spectrometry," *J. Forensic Sci.*, 56, 194-199 (2011).
20. J.A. Barrett, J.A. Siegel, J.V. Goodpaster; "Forensic Discrimination of Dyed Hair Color: II. Multi-variate Statistical Analysis," *J. Forensic Sci.* 56, 95-101 (2011).
21. C.L. Rainey, P.A. Conder, J.V. Goodpaster, "Chemical Characterization of Dissolvable Tobacco Products Promoted To Reduce Harm," *Journal of Agricultural and Food Chemistry* 59, 2745-2751 (2011).

22. R. Hibbard, J.V. Goodpaster, M.R. Evans; "Factors affecting the forensic examination of automotive lubricating oils," *J. Forensic Sci.* 56, 741-753 (2011).
23. J. Cummins, J. Hull, K. Kitts, J.V. Goodpaster, "Separation and Identification of Anions Using Porous Graphitic Carbon and Electrospray Ionization Mass Spectrometry: Application to Inorganic Explosives and Their Post Blast Residues," *Anal. Methods*, 3, 1682 – 1687 (2011).
24. D.A. Turner, J.V. Goodpaster; "The Effect of Microbial Degradation on the Chromatographic Profiles of Tiki Torch Fuel, Lamp Oil, and Turpentine," *J. Forensic Sci.* (In Press).
25. D.A. Turner, J.V. Goodpaster; "Comparing the Effects of Weathering and Microbial Degradation on Gasoline Using Principal Components Analysis," *J. Forensic Sci.* (In Press).

## OTHER PUBLICATIONS

1. V.L. McGuffin, J.V. Goodpaster; "Polycyclic Aromatic Compounds, Fluorescence Quenching," *Encyclopedia of Environmental Analysis and Remediation*, John Wiley and Sons: New York (1998), pp. 3814-3831.
2. S. Balou, J.V. Goodpaster, W. MacCrehan, D. Reeder, "Forensic Analysis," *Anal. Bioanal. Chem.* 376, 148 (2003) (*Guest Editor*).
3. P.A. Dreifuss, J.V. Goodpaster; "Atmospheric Pressure Ionization LC/MS Methods for the Analysis of Black Powder Substitutes," *Proceedings of the 8<sup>th</sup> International Symposium on the Analysis and Detection of Explosives*, Garbutt, D., Pilon, P., Lightfoot, P., Editors, 168-180 (2004).
4. J.V. Goodpaster; "Household Items that Contain Explosive Compounds: A Guide for Explosive-Detecting Canine Handlers," *The Detonator*, 34(2), 42-46 (March/April 2007).
5. J.V. Goodpaster, Book Review of "Trace Quantitative Analysis by Mass Spectrometry" by Robert K. Boyd, Cecilia Basic and Robert A. Bethem for *Journal of the American Chemical Society*, 130, 13183 (2008).
6. J.V. Goodpaster; "Does Amount Matter? Current Research Into the Concept of Odor Availability for Explosives-Detecting Canines," *The Detonator*, 36(5), 64-65 (2009).
7. D.S. Moore, J.V. Goodpaster; "Explosives analysis," *Anal. Bioanal. Chem.*, 395, 245-246 (2009) (*Guest Editor*).
8. J.V. Goodpaster, Book Review of "Quantification in GC and LC: A Practical Guide to Good Chromatographic Data" by H-J Kuss, S. Kromidas, editors for *Journal of Forensic Sciences*, 55, 1407 (2010).

## PRESENTATIONS (\* = Invited Speaker)

1. J.V. Goodpaster, V.L. McGuffin, "Multiwavelength Fluorescence and Fluorescence Quenching Detection in Capillary Separations," *Pittcon 1997*, Atlanta, GA (3/17/97).



2. J.V. Goodpaster, V.L. McGuffin, "Selective Fluorescence Quenching for the Analysis of Petroleum Products and Nitrated Explosives," *Pittcon 1998*, New Orleans, LA (3/4/98).
3. \* J.V. Goodpaster, "Selective Fluorescence Quenching: Theory, Experiment and Application," *8<sup>th</sup> Annual Kenan Award Symposium*, Union Carbide Corporation, South Charleston, WV (4/1/98).
4. J.V. Goodpaster, V.L. McGuffin, "Forensic Applications of Fluorescence and Fluorescence Quenching Detection in Liquid Chromatography," *AAFS Annual Meeting*, Orlando, FL (2/19/99).
5. J.V. Goodpaster, V.L. McGuffin, "Fluorescence Quenching Detection for Liquid Chromatography," *FACSS 1999*, Vancouver, BC (10/25/99).
6. J.V. Goodpaster, B.C. Drumheller, B.A. Benner, Jr., "Extraction and Chemical Analysis of Human Scalp Hair as a Novel Trace Evidence Technique," *Annual Meeting of the Midwestern Association of Forensic Scientists*, Bloomington, MN (9/27/01).
7. \* J.V. Goodpaster, "Evidence That Never Lies: Analytical Chemistry Applied to Human Hair," Department of Chemistry, Gustavus Adolphus College, St. Peter, MN (9/28/01).
8. \* J.V. Goodpaster, "Research in the Field of Forensic Science," *AAFS Annual Meeting (Young Forensic Scientists Forum)*, Atlanta, GA (2/12/02).
9. J.V. Goodpaster, B.C. Drumheller, B.A. Benner, Jr., "Chemical Analysis of Organic Material on the Surface of Human Scalp Hair as a Basis for Forensic Comparisons," *AAFS Annual Meeting*, Atlanta, GA (2/16/02).
10. J.V. Goodpaster, B.A. Benner, Jr., "Limitations of the Retention Gap Technique for the Injection of Large Sample Volumes in Capillary Gas Chromatography/Mass Spectrometry," *Pittcon 2002*, New Orleans, LA (3/18/02).
11. \* J.V. Goodpaster, "A New Alternative for Forensic Hair Comparisons: Chemical Analysis of Hair Surface Components Using GC/MS," *Washington Chromatography Discussion Group*, Rockville, MD (4/19/02).
12. J.V. Goodpaster, R.O. Keto, "Identification of Organic Components in Intact and Burned Black Powder Substitutes Using GC/MS," *AAFS Annual Meeting*, Dallas, TX (2/20/04).
13. \* J.V. Goodpaster, P.A. Dreifuss, "Novel Analyses of Black Powder Substitutes and Their Post-Blast Residues by Reversed Phase ESI LC/MS," *17<sup>th</sup> Sanibel Conference on Mass Spectrometry*, Clearwater Beach, FL (1/29/05).
14. \* J.V. Goodpaster, "Living CSI: Separating Fact from Fiction," *Homecoming 2005*, Gustavus Adolphus College, St. Peter, MN (10/8/05).
15. \* J.V. Goodpaster, "Designing Instrumental and Statistical Solutions to Explosive Problems," Department of Chemistry, Gustavus Adolphus College, St. Peter, MN (2/24/06).
16. \* J.V. Goodpaster, "The Role of Instrumental and Chemometric Analysis in Explosives Investigations," Department of Chemistry and Chemical Biology, IUPUI, Indianapolis, IN (10/11/06).
17. J.V. Goodpaster, "From 'Fuzzy Math' to Functional Tool: The Role of Chemometric Analysis in the Identification and Comparison of Black Electrical Tape," *Annual*

- Meeting of the Midwestern Association of Forensic Scientists*, Indianapolis, IN (10/12/06).
18. \* J.V. Goodpaster, "The Utility of Derivatization in the Analysis of Explosives and Fire Debris," Department of Forensic Science, Virginia Commonwealth University, Richmond, VA (1/31/07).
  19. \* J.V. Goodpaster, "Improving the Analysis and Detection of Explosives Through Instrumental and Statistical Techniques," Naval Surface Weapons Center, Crane Division, Crane, IN (9/13/07).
  20. \* J.V. Goodpaster, "Preventing, Investigating and Reconstructing Explosive Incidents, The Chemist's Role," Butler University, Indianapolis, IN (1/22/08).
  21. \* J.V. Goodpaster, "The Role of a Chemist in an Explosives Investigation," ACS *Career Night* (Hosted By the Chapter of Student Affiliates of the American Chemical Society at IUPUI (Chemistry Club), IUPUI, Indianapolis, IN (9/23/08).
  22. \* J.V. Goodpaster, "Chemometric Analysis as a Means to Differentiate Class Evidence," *FACSS*, Reno, NV (10/1/08).
  23. \* J.V. Goodpaster, "Coming Apart at the Seams: The Anatomy of a Pipe Bomb Explosion," *IUPUI Cutting Edge Lecture Series*, IUPUI, Indianapolis, IN (10/22/08).
  24. \* J.V. Goodpaster, "Beating the Bugs: The Destruction of Ignitable Liquids by Microbes in Fire Debris Evidence," Department of Biology, University of Indianapolis, Indianapolis, IN (11/6/08).
  25. \* J.V. Goodpaster, "What Do Explosives Smell Like? Understanding Canine Detection of Energetic Materials," Manchester College, North Manchester, IN (4/13/09).
  26. \* J.V. Goodpaster, "Applications of Multi-variate Statistics to Forensic Science," *Central Regional Meeting of the American Chemical Society (CERMACS)*, Cleveland, OH (5/20/09).
  27. J.V. Goodpaster, "Analysis of Trace Evidence Using Microspectrophotometry and Multivariate Statistics," *NIJ Trace Evidence Symposium*, Clearwater Beach, FL (8/7/09).
  28. \* J.V. Goodpaster, "'What Do Explosives Smell Like?' Characterizing the Volatile Compounds Available to Explosive-Detecting Canines Using Gas and Liquid Chromatography," *Keynote Speaker at the 31<sup>st</sup> Annual Spring Symposium of the Minnesota Chromatography Forum*, Minneapolis, MN (5/13/10).
  29. J.V. Goodpaster, E.A. Liszewski, C.Szkudlarek, "To What Extent Can Microspectrophotometry Discriminate Red Cotton Fibers?" *Annual Meeting of the Midwestern Association of Forensic Scientists*, Kansas City, MO (10/1/10).
  30. J.V. Goodpaster, E.H. Lotspeich, N. Roemer, "Determining the Amount and Composition of Vapors Sensed by Explosive-Detecting Canines," *10<sup>th</sup> International Symposium on the Analysis and Detection of Explosives*, Canberra, Australia (11/24/10).