

MARK A. ARNOLD

Edwin B. Green Chair Professor in Laser Chemistry, Department of Chemistry, 230 Iowa Advanced Technology Laboratories, University of Iowa, Iowa City, Iowa 52242; Phone: 319-335-1368; Fax: 319-353-1115; e-mail: mark-arnold@uiowa.edu;

EDUCATION

Ph.D. Analytical Chemistry; Department of Chemistry, University of Delaware, 1982.
Dissertation: *Tissue-Based Biocatalytic Membrane Electrodes*.

B.S. Chemistry (American Chemical Society Certified); Indiana University-Purdue University at Indianapolis, May 1978.

PROFESSIONAL APPOINTMENTS

Chair, Department of Chemistry, University of Iowa; 2010 – Present.
Director, Optical Science and Technology Center, University of Iowa; 2000-2010.
Professor of Chemistry, University of Iowa; 1994-Present.
Associate Professor of Chemistry, University of Iowa; 1988-1994.
Assistant Professor of Chemistry, University of Iowa; 1982-1988. Abridge

HONORS

Fellow of the Society for Applied Spectroscopy; 2010.
Edwin B. Green Chair Professor in Laser Chemistry, 2005 – Present.
Regents Award for Faculty Excellence, University of Iowa; 2003.
Collegiate Fellow, College of Liberal Arts and Sciences, University of Iowa; 2001-2006.
Faculty Scholar Award; University of Iowa; 1997-1999.

RECOGNITION

Status of noninvasive glucose sensing - [<web-link>](#); 2011
Invited member of the Board of Directors, University of Iowa Research Foundation, 2008.
Noninvasive glucose monitoring, *Chemical and Engineering News*, vol 80(36) September 9, 2002.
Near infrared spectroscopy for glucose monitoring, *Diabetes Interview*, February 2002.
Measuring sugar with light, *Hippocrates*, Medical Technology on the Horizon (Feb/March, vol 15(2)) 2001.
Summary of noninvasive blood glucose sensing project, *Diabetes Interview* (vol 101) Dec, 2000.
Noninvasive blood glucose sensing progress mentioned in *Technology Review* (MIT vol 103, 2000), and *Time* (Jan 15, 2001).
Noninvasive blood glucose sensing featured in *Science Times* section of the *New York Times*, December 1999 (Also appeared in the *Houston Chronicle* and *International Herald Tribune*.
Invited speaker at the first Gordon Research Conference on Chemical Sensors and Interfacial Design, July 1996.
Noninvasive *in vivo* sensing research featured in *Chemical & Engineering News*; March 18, 1996.
Ethics in chemistry course featured in *Chemical & Engineering News*; October 24, 1994.
Glutamate biosensor research featured in *Chemical & Engineering News*; Sep. 13, 1993.
Noninvasive blood glucose sensing research featured in *Science*; Nov. 6, 1992.
Invited speaker at the first Gordon Conference on Bioanalytical Sensors; June, 1988.

ECONOMIC DEVELOPMENT

ASL Analytical, Inc., BioVentures Center, University of Iowa Research Park, 2500, Crosspark Rd., Suite E224, Coralville, IA.
Co-Founder and Vice President; 2005 – Present.
SBIR Phase I NSF grant– *In Situ* Optical Probe for Real-time Monitoring of Protein Expression Bioreactors; \$150K; 2011.
SBIR Phase 1 Navy grant – Low-Power Artic Environmental Sensors for UUVs; \$25K sub-contract from D-2 Incorporated; 2011.
Vital Infrared Sensor Technology Acceleration Program (VISTA-W909MY-10-R-0006); three year sub-contract; \$495K, 2011.
Merck Pharmaceuticals, Evaluation of Bioreactor Monitor; \$220K; 2010-2012.
SBIR Phase II NSF grant – Continuous Near Infrared Monitor for *Pichia Pastoris* ; \$500K; 2011-2013.
SBIR Phase I grant – Array Processing Techniques for III-V Material, Strained Superlattice, Mid and Long Wavelength, High Sensitivity Infrared Sensors; U.S. Army; \$70K; awarded January 2010 – September 2010.
BioVentures Center, University of Iowa Research Park, First company occupant; December 2008.
SBIR Phase I NSF grant - Noninvasive Spectroscopic Monitor to Controlling *Pichia* Fermentations; \$100K; 2008.
IQE partnership FastFPA program – Analytical Characterization of Group (II-V) Semiconductor Wafers; \$308K; 2008.
STTR Phase I NIDDK - Nocturnal Hypoglycemic Alarm; \$967K; 2007.
Iowa Center of Entrepreneurship gap grant award; 2006.

Series A financing; May 2006.

Established Collaboration with UI Center for Biocatalysis and Bioprocessing, 2008.

Strategic Partnership, Broadley James Corporation, 2010.

PROFESSIONAL ACTIVITIES (Since 2000)

Symposia and Lectures

Invited lecture, LG Electronics Life Sciences Group, Noninvasive Glucose Sensing Internal Workshop: March 31, 2011.

Organizer and moderator for Noninvasive Glucose Sensing Workshop; Diabetes Science and Technology Meeting, Bethesda, MD, November 13, 2008.

Program Chair, Mid-West Regional Meeting of the American Chemical Society; October, 2009.

Annual Optical Science and Technology Center Symposium; Optics in Biosciences; Organized, Moderated, and Presented; February 2008.

Guidelines and Recommendations for Laboratory Analysis in the Diagnosis and Management of Diabetes Mellitus; Working committee for the American Association of Clinical Chemists, guidelines for noninvasive glucose sensing; 2008.

Economic Development Presentation to Iowa State Board of Regents, October 31, 2007.

Moderator for Noninvasive Glucose Sensing Workshop; Diabetes Science and Technology Meeting, San Francisco, Oct. 2007.

Organized and Moderated Workshop on Intellectual Property – Optical Science and Technology Center, March 29, 2007.

Optical Science and Technology Center Symposium; Solving Problems with Optics; Organized and Moderated; Feb. 2007.

Optical Science and Technology Center Symposium; Optics and Materials; Organized and Moderated; April 2006.

Optical Science and Technology Center Symposium Series, Organized and Hosted; Spring and Fall 2006.

Invited lecture, Gordon Research Conference on Bioanalytical Sensors; Queens College, Oxford, UK, July 4-9, 2004.

Co-Editor, *Current Opinion in Chemical Biology*, Issue on Analytical Techniques, Volume 6, October 2002.

Moderator and Organizer for Breakout Session: *Diagnostic Technologies*, BECON 2002, National Institutes of Health, Bethesda, Maryland; June 25-25, 2002.

Symposium Organizer and Presider: *Noninvasive and Minimally Invasive Methods for Measuring Blood Glucose*, National Meeting of the American Chemical Society, Boston, MA; August 2002.

Symposium Organizer and Chair: *Optical Science and Technology Symposium*, University of Iowa Campus, September 2002.

Invited lecture, Noninvasive Technology, Association of Clinical Biochemists, London Docklands, UK, May 2001.

STS-93 Space Shuttle Mission; Evaluate Bioreactor Oxygen Sensors in Microgravity; July 22-27, 1999.

Invited lecture, Continuous Blood Glucose Monitoring in People with Diabetes, Canadian Diabetes Association, October 1999.

Symposium Organizer and Presider: *Spectroscopic Methods for Noninvasive Sensing in Clinical Chemistry*, Pittsburgh Conference, New Orleans, Louisiana, March 17, 2000.

Journal Editorial and Advisory Boards

Editorial Board, *Analytical Letters*, January 2008 – 2010.

Editorial Board, *Journal of Diabetes Technology*, March 2006 – Present. (Founding member)

Editorial Board, *Biotechnology and Bioengineering*, January 2003 – Present.

Editorial Board, *Sensors*, International Advisory Editorial Board, July 2001 – December 2006.

Editorial Board, *e-Biomed: Journal of Regenerative Medicine*, December 1999 – Present.

Editorial Board, *Diabetes Technology and Therapeutics*, September 1998 – Present. (Founding member)

Editorial Board, *Applied Biochemistry and Biotechnology*, January 1994 – Present.

Editorial Advisory Board, *Talanta*, March 1994 – September 2001.

Proposal Review Panels

National Institutes of Health, NIDDK Artificial Pancreas Review (ZDK1-GRB-N-M1); February, 2012.

National Institutes of Health, NIDDK Artificial Pancreas Review (ZDK1-GRB-G-M3); March, 2011.

National Institutes of Health, BCMB-A Transformative R01 RFA Study Panel; May 2009.

Medical Research Council, United Kingdom; Developmental Pathway Funding Scheme; October 2008.

Diabetes UK; Research grant application review; June, 2008.

National Institutes of Health, Diabetes, Obesity, and Nutrition, ZRG1 – EMNR-E (10) Special Emphasis Panel; February, 2008.

NIH, Endocrinology, Metabolism, Nutrition and Reproductive Sciences Study Section, EMNR-E (10) B, March 2007.

National Institutes of Health, SPDP Study Section meeting: Jun 9-10, 2006.

National Institutes of Health, Skeletal Biology Development and Disease Study Section, June 9-11, 2006.
National Institute of Biomedical Imaging and Bioengineering; Program Project Grant Review; Point-of-Care Nanodiagnostics and Nanotherapeutics; November, 2006.
National Institutes of Health, Kidney Related Small Business Review Panel; December, 2005.
Ireland Science Foundation, September, 2005.
National Institute of Biomedical Imaging and Bioengineering, ZEB1 OSR-C (O2) R13 Grant Reviews; June, 2005.
American Institute of Biological Sciences; Advanced Technology Program; May, 2005.
NIH, Endocrinology, Metabolism, Nutrition and Reproductive Sciences Study Section, EMNR-E (10) B, February, 2004.
NIH, Endocrinology, Metabolism, Nutrition and Reproductive Sciences Study Section, EMNR-E (10) B, June, 2004.
NIH, Endocrinology, Metabolism, Nutrition and Reproductive Sciences Study Section, EMNR-E (10) B, October, 2004.
National Institute on Alcohol Abuse and Alcoholism, Integrated Alcohol Sensing and Data Analysis System: Advisory Panel Member, May, 2003.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, October, 2004.
Chair - NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, June, 2003.
Chair - NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, February, 2003.
Chair - NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, October, 2002.
Chair - NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, February, 2002.
Chair - NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, October, 2001.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, June, 2001.
NIH, Advanced Research Program Evaluation of Integrated Alcohol Sensing and Data Analysis Systems, April 2001.
International Science and Technology Center; United States Civilian Research and Development Foundation for the Independent States of the Former Soviet Union, May 2001.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, February, 2001.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, October, 2000.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, June, 2000.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, February, 2000.
NIH, Bioanalytical Engineering and Chemistry Study Section, ZRG1 BECM, October, 1999.

Industrial Consultantships

LG Electronics, Seoul, Korea, 2011
Rembrandt IP Management, Pennsylvania; 2010
Bay City Capital, San Francisco, California; 2008.
All Protect, LLP, Pasadena, California; December 2007 – 2009.
Paramount Biosciences, Cambridge, MA; 2007.
Blue Chip Venture Company, Cincinnati, Ohio; 2006.
Stanford Research International, San Francisco, California, 2005, 2006, 2007, 2008.
ATK Thiokol, Edina, Minnesota, 2005.
ASL Analytical, Iowa City, Iowa, 2005.
Oculir, San Diego, California, 2004 – 2005.
RiboDevices, Omaha, Nebraska, 2003 – (August – September) 2008.
PerkinElmer Optoelectronics, Fremont, California, 2003.
Biox, LLC, Emeryville, California, 2003.
Metaphase, Inc., Palo Alto, California, 2003.
Lifescan, Milpitas, California, 2002.
Inverness Medical Technology, 2000-2002.
Optix, Cambridge, Massachusetts, 1997-2003.
Wyle Laboratories, Houston, Texas, 2000-2002.
Selfcare, Waltham, Massachusetts, 1993-2000.

Professional Societies

American Chemical Society, Analytical Division; 1978-Present.
Society for Applied Spectroscopy; 1989-Present.
Optical Society of America; 1997-Present.

Selected Departmental Committees

Articulation Meeting – Articulating Chemistry in the State of Iowa, February 10, 2012.

Chemistry Careers Day, December 3, 2011.
 Chemistry representative at the 2011 MASUA Chemistry Chairs Meeting, October 21-22, 2011.
 Chemistry Appreciation Night, May 12, 2011.
 Analytical Faculty Search Committee (Chair), 2009-10.
 Hosted Min Ren (Pioneer Hybrid) as analytical seminar speaker, December, 2008.
 Chemistry Building Renovation proposal to Roy J. Carver Charitable Trust, June 2007.
 Hosted Milan Mrksich as Departmental Colloquium Speaker, January 20, 2006.
 Hosted Mark Schoenfisch as Departmental Colloquium Speaker, February 3, 2006.
 Executive Committee, Department of Chemistry; 1992-1998, 1999-Present.
 Chair, Analytical Search Committee, Department of Chemistry, 2003-2004.
 Analytical Search Committee Member, Department of Chemistry, 2002-2003.
 Chair, Analytical Search Committee, Department of Chemistry, 2001-2002.
 Chemistry DEO Search Committee, 2000-2001.

Selected University and College Committees

Search committee for Executive Director of the University of Iowa Research Foundation, 2012
 CIC DEO Program, Chicago, Illinois, August 11-13, 2011.
 Search Committee OSTC Administrative Assistant; December 2010.
 Regent Award Selection Committee, University of Iowa, 2010.
 Board of Directors, University of Iowa Research Foundation; 2008 – Present.
 President's Roundtable Discussion on Technology Transfer and Entrepreneurship; September 25, 2008.
 IATL Building Evacuation committee, 2008 - 2010.
 Microfabrication Facility Equipment purchase oversight, 2008 – 2010.
 Internal Review of Beckman and Searle Award Applications, Vice President for Research; August, 2008.
 Organized and purchased TeraView Tera-Hertz spectrometer for interdisciplinary research, April, 2008.
 CLAS New Faculty Orientation Presentation: Funding for Research in the Physical Sciences; 2006-2009.
 Dean's Advisory Board Meeting Presentation; September 15, 2006.
 University of Iowa, Strategic Planning Committee, 2004 - 2005.
 Graduate College Outstanding Mentor Award Evaluation Committee, September 2004.
 Junior Faculty Search Committee, Department of Chemical and Biochemical Engineering, 2003-4.
 Faculty Scholar Review Committee, College of Liberal Arts and Sciences, and Office of the Provost, 2003.
 Task Force on Excellence, College of Liberal Arts and Sciences, 2002.
 Iowa Social Science Institute Review Committee, College of Liberal Arts and Sciences, 2002.
 DuPont Patents Advisory Committee, Center for Biocatalysis and Bioprocessing; 1999-2002.
 University Conflict of Interest in Sponsored Programs Committee; 1996-2006.
 Executive Committee, Optical Science and Technology Center; 1996-2010.
 Recreational Services Organizational Review, 2001.
 Promotion & Tenure Committee (Chair) and Departmental Consulting Group (Chair), Geoscience, 2000.

Interdisciplinary University Affiliations

Nanoscience and Nanotechnology Institute; 2007-Present.
 Optical Science and Technology Center; 1995-Present.
 Center for Biocatalysis and Bioprocessing (CBB); 1983-Present.
 Medical Scientist Training Program – Mentor; 1999-2001.

Outreach Activities

Science, Technology, Engineering, and Mathematics (STEM) Presentation at City High School, January 24th, 2008
 Organized and led high school tour of the Optical Science and Technology Center, April 11, 2008.

SCHOLARSHIP (Since 2000)

Peer-Reviewed Publications

1. Smith, RM; Arnold, MA; Terahertz time-domain spectroscopy of solid samples: Principles, applications, and challenges; *Applied Spectroscopy Review* **2011**, 46 636-679.
2. Xiang, D; Arnold, MA; Solid-state digital micro-mirror array near infrared spectrometer for Hadamard transform analytical spectroscopy; *Applied Spectroscopy*, **2011** 65 1170-1180.

3. Sacks DB; Arnold, M; Bakris, GL; Bruns, DE; Horvath, AR; Kirkman, MS; Lernmark, A; Metzger, BE; Nathan, DM; Executive Summary: Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus; *Clinical Chemistry* **2011**, 57 793-798.
4. Sacks DB; Arnold, M; Bakris, GL; Bruns, DE; Horvath, AR; Kirkman, MS; Lernmark, A; Metzger, BE; Nathan, DM; Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus; *Clinical Chemistry* **2011**, 57 e1-e47.
5. Park, SC; Shinzawa, H; Chung, H; Ozaki, Y; Arnold, MA; Improved Accuracy for Raman Spectroscopic Determination of Polyethylene Property by Optimization of Measurement Temperature and Elucidation of Its Origin by Multiple Perturbation Two-Dimensional Correlation Spectroscopy; *Analyst* **2011** 136, 3121-3129.
6. Alexeeva, NV; Arnold, MA; Impact of tissue heterogeneity on noninvasive near infrared glucose measurements in interstitial fluid of rat skin; *Journal of Diabetes Science and Technology* **2010**; 4:1041-1054.
7. Tarumi, T; Amerov, AK; Arnold, MA; Small, GW; Design considerations for near-infrared filter photometry: effects of noise sources and selectivity; *Applied Spectroscopy* **2009** 63:700-708.
8. Alexeeva, NV; Arnold, MA; Near infrared micro-spectroscopic analysis of rat skin tissue heterogeneity in relation to noninvasive glucose sensing; *Journal of Diabetes Science and Technology* **2009** 3, 219-232.
9. Liu, L; Arnold, MA; Selectivity for glucose, glucose-6-phosphate, and pyruvate in ternary mixtures from the multivariate analysis of near infrared spectra; *Analytical and Bioanalytical Chemistry* **2009**, 393, 669-677.
10. Bai, C.; Graham, TL; Arnold, MA; Assessing and advancing technology for the noninvasive measurement of clinical glucose; *Analytical Letters* **2008**, 41, 2773-2793.
11. Sacks, DB; Arnold, MA; Diabetic control with non-invasive devices; *Proceedings XVI Winter Course: Quality Control in Telemedicine.Biobanking* (Ed. Ferrer-Roca O) **2008**, 81-85.
12. Cho, DS; Olesberg, JT; Flanigan, MJ; Arnold, MA; *On Line* near infrared spectrometer to monitor urea removal in real-time during hemodialysis; *Applied Spectroscopy* **2008** 62, 866-872.
13. Arnold, MA; Liu, L; Olesberg, JT; Selectivity assessment of noninvasive glucose measurements based on analysis of multivariate calibration vectors; *Journal of Diabetes Science and Technology*, **2007** 1(4), 454-462.
14. Ren, M; Arnold, MA; Comparison of multivariate calibration models for glucose, lactate and urea from near infrared and Raman spectra; *Analytical and Bioanalytical Chemistry* **2007** 387, 879-888.
15. Lee, Y-B; Chung, H; Arnold, MA; Improving the robustness of a PLS model based on pure component selectivity analysis and range optimization: Case study for the analysis of an etching solution containing hydrogen peroxide; *Analytica Chimica Acta* **2006** 572, 93-101.
16. Amerov, AK; Small, GW; Arnold, MA; Selective multivariate analysis of blood glucose with near infrared spectral range; *SPIE Proceedings* **2005**, 6007, 180-189.
17. Kanukurthy K, Viswanathan U, Andersen DR, Olesberg J, Arnold MA, and Coretsopoulos C, "Controller for a continuous near infrared glucose sensor", *Proc. Sensors for Industry Conf. (SICON/05), Houston, TX, Feb. 8-10, 2005*, 59-65.
18. Kanukurthy, K; Andersen, DR; Olesberg, J; Arnold, MA; Coretsopoulos, C; Wireless NIR glucose sensor controller; *Proceeding of the International Conference on Biomedical Engineering* **2005**; Paper YIA-04; Dec. 7-10, 2005.
19. Olesberg JT; Liu L; Van Zee V; and Arnold MA; "In vivo near-infrared spectroscopy of rat skin tissue with varying blood glucose levels," *Analytical Chemistry* **2006**, 78: 215-223.
20. Olesberg JT, Cao C, Yager JR, Prineas JP, Coretsopoulos C, Arnold MA, Olafsen LJ, Santilli M, "Optical microsensor for continuous glucose measurements in interstitial fluid," *SPIE Proceedings* **2006** 6094 16-25.
21. Amerov AK; Chen, J; Small, GW; Arnold, MA; Scattering and absorption effects in the determination of glucose in whole blood by near infrared spectroscopy; *Analytical Chemistry* **2005** 77, 4587-4594.
22. Olesberg JT, Arnold MA, Mermelstein C, Schmitz J, and Wagner J, "Tunable laser diode system for noninvasive blood glucose measurements," *Applied Spectroscopy* **2005**, 59: 1480-1484.

23. Olesberg JT, Arnold MA, Mermelstein C, Schmitz J, and Wagner J, "Tunable laser diode system for noninvasive blood glucose measurements," *SPIE Proceedings* **2005**, 5702: 23-29.
24. Jones, WF; Arnold, MA; Wiencek, JM; Precipitant-controlled growth of lysozyme crystals in sodium thiocyanate, *Journal of Crystal Growth and Design* **2004** 4, 1387-1393.
25. Amerov, AK; Chen, J; Arnold, MA; Molar absorptivities of glucose, water and other biological molecules over the first overtone and combination regions of the near infrared spectrum, *Applied Spectroscopy* **2004** 58, 1195-1204.
26. Chen, J; Arnold, MA; Small, GW; Comparison of combination and first overtone spectral regions for near infrared calibration models for glucose and other biomolecules in aqueous solutions, *Analytical Chemistry* **2004** 76, 5405-5413.
27. Olesberg, JT; Liu, L; Van Zee, V; Arnold, MA; *In vivo* near-infrared spectroscopy of rat skin tissue with varying blood glucose levels, *Proceedings of the SPIE* **2004**, 5325, 11–20.
28. Amerov, AK; Chen, J; Small, GW; Arnold, MA; The influence of glucose upon the transport of light through whole blood, *Proceedings of the SPIE* **2004**, 5330, 101-111.
29. Rhiel, MH; Cohen, MB; Arnold, MA; Murhammer, DW; On-line monitoring of human prostate cancer cells in a perfusion rotating wall vessel by near-infrared spectroscopy, *Biotechnology and Bioengineering* **2004** 86, 852 – 861.
30. Arnold, MA; Small, GW; Xiang, D, Qiu, J; Murhammer, DW; Pure component selectivity analysis of multivariate calibration models from near infrared spectra, *Analytical Chemistry* **2004** 76, 2583-2590.
31. Eddy, CV; Olesberg, JT; Flanigan, M; Arnold, MA; Online measurement of urea concentration in spent dialysate during hemodialysis, *Clinical Chemistry* **2004** 50, 175-181.
32. Waboma, MJ; Small, GW; Arnold, MA; Evaluation of selectivity and robustness of near-infrared glucose measurements based on short-scan Fourier transform infrared interferograms, *Analytica Chimica Acta* **2003** 490, 325-340.
33. Zhang, L; Small, GW; Arnold, MA; Multivariate calibration standardization across instruments for the determination of glucose by Fourier transform near-infrared spectroscopy; *Analytical Chemistry* **2003** 75, 5905-5915.
34. Amerov, AK; Arnold, MA; *In Vivo* Kromoscopic analysis of glucose in blood; *Proceedings of the SPIE* **2003** 4965, 7-16.
35. Eddy, CV; Flanigan, M; Arnold, MA; Near infrared spectroscopic measurement of urea in dialysate samples collected during hemodialysis treatments; *Applied Spectroscopy* **2003** 57, 1230-1235.
36. Saarinen, MA; Reece, JS; Arnold, MA; Murhammer, DW; Monitoring and controlling the dissolved oxygen (DO) concentration within the high aspect ratio vessel (HARV); *Biotechnology Progress* **2003**, 19, 1335-1341.
37. Winkenwerder, JJ; Palechek, PL; Reece, JS; Saarinen, MA; Arnold, MA; Cohen, MB; Murhammer, DW; Evaluating prostate cancer cell culturing methods: A comparison of cell morphologies and metabolic activity, *Oncology Reports* **2003** 10, 783-789.
38. Reece, JS; Miller, MJ; Arnold, MA; Waterhouse, C; Delaplaine, T; Cohn, L; Cannon, T; Continuous oxygen monitoring of mammalian cell growth on space shuttle mission STS-93 with a novel radioluminescent oxygen sensor, *Applied Biochemistry and Biotechnology* **2003** 104, 1-11.
39. Zhang, L; Small, GW; Arnold, MA; Calibration standardization algorithm for partial least-squares regression: Application to the determination of physiological levels of glucose by near-infrared spectroscopy; *Analytical Chemistry* **2002** 74, 4097 – 4108.
40. Green, CE; Wiencek, JM; Arnold, MA; Multivariate calibration models for lysozyme from near-infrared transmission spectra in scattering solutions, *Analytical Chemistry* **2002**, 74, 3392-3399.
41. Rhiel, M; Cohen, MB; Murhammer, DW; Arnold, MA; Nondestructive near infrared spectroscopic measurement of multiple analytes in undiluted samples of serum-based cell culture media, *Biotechnology and Bioengineering*, **2002**, 77, 73-82.
42. Olesberg, JT; Armitage, B; Arnold, MA; Flanigan, MJ; On-line measurement of urea concentration in spent dialysate during hemodialysis, *Proceedings of the SPIE* **2002**, 4624, 95-105.

43. Amerov, AK; Yu, S; Small, GW; Arnold, MA; Kromoscopic measurement of glucose in the first overtone region of the near infrared spectrum, *Proceedings of the SPIE* **2002**, 4624, 11-19.
44. Eddy, C; Arnold, MA; Near infrared spectroscopy for measuring urea in hemodialysis fluids, *Clinical Chemistry*, **2001** 47, 1279-1286.
45. Amerov, AK; Yu, S; Arnold, MA; Small, GW; Kromoscopic analysis in two and three component aqueous solutions of blood constituents, *Proceedings of the SPIE* **2001** 4363, 1-10.
46. Hu, S-YB; Wiencek, JM; Arnold, MA; Application of near-infrared spectra to temperature-controlled protein crystallization – A simulation study; *Applied Biochemistry and Biotechnology* **2001** 94, 179-196.
47. Patterson, SL; Sluka, KA; Arnold, MA; Novel transverse push-pull micro-probe: *In vitro* characterization and *in vivo* demonstration of the enzymatic production of adenosine in the spinal cord dorsal horn, *Journal of Neurochemistry* **2001** 76, 234-246.
48. Olesberg, JT; Arnold, MA; Hu, S-YB; Wiencek, JM; Temperature insensitive near-infrared method for determination of protein concentration during protein crystal growth, *Analytical Chemistry* **2000** 72, 4985-4990.
49. Burmeister, JJ; Arnold, MA; Small, GW; Noninvasive blood glucose measurements by near infrared transmission spectroscopy across human tongues, *Diabetes Technology & Therapeutics* **2000** 2, 5-16.
50. Helwig, AM; Arnold, MA; Small, GW; Evaluation of Kromoscopy: Resolution of glucose and urea, *Applied Optics* **2000** 39, 4715-4720.
51. Hu, S-Y B; Arnold MA; Wiencek, JM; Temperature-independent near-infrared analysis of lysozyme aqueous solutions, *Analytical Chemistry* **2000** 72, 696-702.
52. Cingo, NA; Small, GW; Arnold, MA; Determination of glucose in a synthetic biological matrix with decimated time-domain filtered near-infrared interferogram data, *Vibrational Spectroscopy* **2000** 23, 103-117.
53. Riley, MR; Arnold, MA; Murhammer, DW; Effect of sample complexity on quantification of analytes in aqueous samples by near infrared spectroscopy; *Applied Spectroscopy* **2000** 54, 255-261.
54. Chung, H; Arnold, MA; Near infrared spectroscopy for monitoring starch hydrolysis, *Applied Spectroscopy* **2000** 54, 277-283.
55. Hu, SB; Lillquist, A; Arnold, MA; Wiencek, JM; Partial-least squares analysis of lysozyme near-infrared spectra; *Applied Biochemistry and Biotechnology* **2000** 87, 153-163.

Critical Reviews and Editorials

1. Arnold, MA; Small, GW; Perspectives in Analytical Chemistry: Noninvasive glucose sensing; *Analytical Chemistry* **2005** 77, 5429-5439.
2. Leary, JA; Arnold, MA; Bioanalytical Chemistry, Current Opinion in Chemical Biology 2002 6, 631-632.
3. Arnold, MA; *In vivo* chemical sensing: opportunities and challenges, *e-biomed: Regenerative Medicine* **2000** 1, 55-58.
4. Arnold, MA; Klonoff, DC; Noninvasive laser measurement of blood glucose in the eye – a bright idea or an optical illusion?, Editorial for *Diabetes Technology & Therapeutics*, **1999** 1, 117-119.

Book Chapters

1. Arnold, MA; Olesberg, JT; Small, GW; Near-infrared spectroscopy for noninvasive glucose sensing; in Analytical Chemistry of *In Vivo* Glucose Measurements; Cunningham, D.; Stenken, JA, Eds.; Wiley Chemical Analysis Series, 2009, Chapter 13.
2. Shih, W-C; Bechtel, KL; Feld, MS; Arnold, MA; Small, GW; Introduction to spectroscopy for noninvasive glucose sensing; in Analytical Chemistry of *In Vivo* Glucose Measurements; Cunningham, D.; Stenken, JA, Eds.; Wiley Chemical Analysis Series, 2009, Chapter 12.

Book Reviews and Editorials

1. Arnold, MA; Review of the monograph Chemometrics in Analytical Spectroscopy; *Journal of the American Chemical Society* **2004** 126, 14678-14679.

2. Arnold, MA; Review of the monograph IR Spectroscopy: An Introduction; *Clinical Chemistry* **2003** 49, 1423.
3. Arnold, MA; Review of the monograph Near-Infrared Applications in Biotechnology; *Journal of the American Chemical Society* **2001**, 123, 12746-12747.

Patents and Intellectual Property

1. Olesberg, JT; Arnold, MA; U.S. Patent Application: Reagentless optical analyte detection system; U.S. Application Serial Number: 11/397,927; April 4, 2006; Notice of Allowance of Claims, March 22, 2012.
2. Olesberg, JT; Arnold, MA; Small, GW; UIRF Patent Disclosure; Dual LED emitter for spectral referencing with modulation; 2008.
3. Olesberg, JT; Arnold, MA; U.S. Patent #7,460,895; Method for generating a net analyte signal calibration model and uses thereof; December 6, 2008.
4. Olesberg, JT; Arnold, MA; U.S. Provisional Patent: Reagentless optical sensor for measuring biomolecules in interstitial fluid; submitted April 2, 2005.
5. Small, GW; Arnold, MA; U.S. Patent: Method and apparatus for non-invasive determination of physiological chemicals, particularly glucose; #6,061,582, May 9, 2000.

Selected Invited and Symposium Presentations

1. Arnold, MA; Noninvasive analytical measurements for clinical monitoring; Department of Chemistry and Biochemistry, University of Northern Iowa, Cedar Falls, Iowa; October 13, 2011.
2. Arnold, MA; Measuring hyper and hypo glycemia with noninvasive near-infrared spectroscopy; Technologies for Metabolic Monitoring; Annual meeting of the Diabetes Technology Society; Bethesda, Maryland; November 12, 2010.
3. Arnold, MA; Chemical sensing with near infrared spectroscopy; Bio-Research Products; North Liberty, Iowa; September 1, 2010.
4. Arnold, MA; Noninvasive clinical sensing with near infrared spectroscopy; Department of Chemistry, Central College, Pella, Iowa; September 27, 2010.
5. Arnold, MA; Biosciences in Chemistry; Bioscience New Student Orientation; Biosciences Program, University of Iowa, Iowa City, Iowa; August 19, 2010.
6. Arnold, MA; Noninvasive chemical monitors for medicine and biotechnology with near infrared optics; Department of Chemistry, University of Nebraska – Kearney, Kearney, Nebraska; November 20, 2009.
7. Arnold, MA; Noninvasive chemical monitors for medicine and biotechnology with near infrared optics; Sigma Xi, John Deere Chapter; College of Arts and Science, St. Ambrose College, Davenport, IA; November 17, 2009.
8. Arnold, MA; Issues of measurement variance in noninvasive glucose sensing with near infrared spectroscopy; Invited presentation at Workshop B – Noninvasive Glucose Monitoring; Eighth Annual Diabetes Technology Society meeting, Bethesda, Maryland; November 13, 2008.
9. Arnold, MA; From semiconductor optics to rat skin measurements: Progress in noninvasive near infrared spectroscopy; Invited presentation at the sixth annual Optical Science and Technology Symposium; February 8, 2008.
10. Arnold, MA; Terahertz Spectroscopy: What is it and how can it be used?; College of Dentistry, University of Iowa, November 18, 2008.
11. Arnold, MA; Five Things to Know about pH Measurements; Analytical Division, Department of Chemistry, University of Iowa, Iowa City, Iowa, November 6, 2008.
12. Arnold, MA; Continuous urea monitoring during hemodialysis with near infrared spectroscopy; Nephrology Hypertension Conference, Division of Nephrology, Carver College of Medicine, University of Iowa; January 28, 2008.
13. Arnold, MA; Advanced in continuous urea monitoring with near infrared spectroscopy; Spectroscopy Laboratory, Department of Physics, Massachusetts Institute of Technology; March 21, 2007.
14. Arnold, MA; Noninvasive glucose measurements; Invited presentation at the Updated Clinical and Laboratory

Guidelines for the Diagnosis and Management of Diabetes, 28th Arnold O. Beckman Conference; November 15-16, 2007.

15. Arnold, MA; ASL Analytical: Noninvasive monitors for glucose and other metabolites; Invited presentation to the Board of Regents for the State of Iowa; October 31, 2007.
16. Arnold, MA; Near infrared spectroscopy for noninvasive glucose monitoring; Invited presentation at the Workshop B – Noninvasive Glucose Monitoring; Seventh Annual Diabetes Technology Society meeting, San Francisco, California; October 25-27, 2007.
17. Arnold, MA; Bio-monitoring with near infrared spectroscopy: Issues of selectivity: Broadley-James Corporation; Irvine, California; October 10, 2007.
18. Arnold, MA; Can glucose be measured selectively and noninvasively with near infrared spectroscopy? Invited presentation at the 6th annual meeting of the Diabetes Technology Society; Atlanta, Georgia; November 3, 2006.
19. Arnold, MA; Challenges for measuring glucose in people with near infrared spectroscopy; Department of Chemistry, Loras College, Dubuque, Iowa; October 4, 2006.
20. Arnold, MA; Noninvasive blood glucose measurements and other analytical challenges with near infrared spectroscopy; Department of Chemistry and College of Engineering; University of Memphis, Memphis, Tennessee, March 3, 2006.
21. Arnold, MA; Noninvasive bioanalytical measurements with near infrared spectroscopy; Department of Chemistry, Gustavus Adolphus College, Saint Peter, Minnesota; February 15, 2006.
22. Arnold, MA; Near infrared spectroscopy for noninvasive glucose measurements; MicroSystems Innovation Center, SRI International, Menlo Park, California; July 29, 2005.
23. Arnold, MA; Near infrared spectroscopy for noninvasive glucose measurements; Department of Chemistry, Central College, Pella, Iowa; March 22, 2005.
24. Arnold, MA; Noninvasive *in vivo* sensing with near infrared spectroscopy; presentation in symposium entitled: *In vivo* analytical chemistry: From glucose to 'omics'; Pittcon 2005, Orlando, Florida; March 4, 2005.
25. Arnold, MA; Optical methods for noninvasive blood glucose analysis; Presentation delivered at the Lester Wolfe Workshop in Laser Biomedicine: Optical methods for managing diabetes: Will technology or biology succeed first?, Massachusetts Institute of Technology, Cambridge, Massachusetts; November 16, 2004.
26. Arnold, MA; Noninvasive glucose sensing with near infrared spectroscopy; Presentation delivered at the Bioanalytical Sensors Gordon Research Conference, Oxford, England; July 8, 2004.
27. Arnold, MA; The National Nanotechnology Initiative: New opportunities for UI researchers; Presentation delivered at Nanotech@UI the first symposium on Nanoscience and nanotechnology at the University of Iowa, Iowa City, Iowa, November 12, 2003.

Selected Contributed Presentations

1. Bai, C; Arnold, MA; Non-invasive glucose sensing on animal models by near infrared spectroscopy; oral presentation presented at the Eastern Analytical Symposium, Somerset, New Jersey; November 15, 2011.
2. Gibson, ER; Koerperick, E; Lanz, K; Olesberg, JT; Small, GW; Arnold, MA; Continuous near infrared monitor for *Pichia Pastoris* bioreactors; Poster presented at the 20th Annual Biocatalysis and Bioprocessing Conference – Current Topics in Industrial Biotechnology; Center for Biocatalysis and Bioprocessing, University of Iowa, Iowa City, Iowa October 17-18, 2011.
3. Smith, R; Arnold, MA; Quantitation of gaseous pollutants at ppm concentrations using THz-TDS: Oral paper presented at the Mid-Atlantic Regional Meeting of the American Chemical Society; College Park, Maryland; May 21-24, 2011.
4. Alexeeva, NV; Arnold, MA; Near-infrared microspectroscopic characterization of skin tissue heterogeneity and its impact on noninvasive measurements of glucose; Poster presented at the 9th annual Optical Science and Technology Symposium; University of Iowa, Iowa City, Iowa; April 15, 2011.

5. Smith, R; Arnold, MA; Analysis of gaseous pollutants in the Terahertz Frequency Range; Poster presented at the 9th annual Optical Science and Technology Symposium; University of Iowa, Iowa City, Iowa; April 15, 2011.
6. Smith, R; Arnold, MA; Gaseous pollutant analysis in the terahertz frequency range; Oral paper presented at Pittcon 2011, Atlanta, Georgia; March 17, 2011.
7. Qian, J; Arnold, MA; Temperature-insensitive glucose measurements in bovine blood ultrafiltrate with near-infrared spectroscopy; Poster presented at the 20th annual Center for Biocatalysis and Bioprocessing Conference: Industrial Biotechnology and Biopharmaceuticals; University of Iowa, Iowa City, Iowa; October 18, 2010.
8. Alexeeva, NV; Arnold, MA; Heterogeneous chemical distribution of skin layers and its impact on noninvasive glucose measurements with combination near infrared spectroscopy; Poster presented at Pittcon 2010, Orlando, Florida; March 2, 2010.
9. Arnold, MA; Continuous glucose monitoring with an ultrafiltrate probe coupled with a solid-state near infrared spectrometer; Oral paper presented at Pittcon 2010, Orlando, Florida; March 1, 2010.
10. Thomas, D; Bai, C; Graham, T; Arnold, MA; Variability in noninvasive near infrared spectra of human skin tissue; Poster presented at the 44th Midwest Regional Meeting of the American Chemical Society; Iowa City, Iowa; October 23, 2009.
11. Peroza, CA; Arnold, MA; On-line monitor of glucose isomerization activity with near infrared spectroscopy; Poster presented at the 44th Midwest Regional Meeting of the American Chemical Society; Iowa City, Iowa; October 23, 2009.
12. Qian, J; Arnold, MA; Temperature-insensitive multivariate calibration technique for near-infrared spectroscopic measurements at combination wavelengths; Oral paper presented at the 44th Midwest Regional Meeting of the American Chemical Society; Iowa City, Iowa; October 22, 2009.
13. Watkins, DL; Olesberg, JT; Boggess, TF; Arnold, MA; Increased light extraction of InAsGaSb LED through wet chemical etching; Poster presented at the 44th Midwest Regional Meeting of the American Chemical Society; Iowa City, Iowa; October 22, 2009.
14. Negm, S; Arnold, MA; Investigation of thermophoresis effect on laser trapping of Sf-9 insect cells; Oral paper presented at the 44th Midwest Regional Meeting of the American Chemical Society; Iowa City, Iowa; October 22, 2009.
15. Choi, J-Y; Miller, M; Arnold, MA; Multivariate calibrations with a digital micro-mirror array spectrometer; Oral presentation at Pittcon 2009; Chicago, Illinois; March 11, 2009.
16. Bai, C; Arnold, MA; Noninvasive near-infrared living tissue spectra under hyper- and hypo-glycemic conditions; Oral presentation at Pittcon 2009; Chicago, Illinois; March 11, 2009.
17. Alexeeva, N; Arnold, MA; Near-infrared micro-spectroscopic analysis of spatial distribution of principal chemical components in rat skin tissue; Oral presentation at Pittcon 2009; Chicago, Illinois; March 10, 2009.
18. Smith, R; Kim, J; Arnold, MA; Chung, H; Small, GW; Gas analysis in the terahertz range; Oral presentation at Pittcon 2009; Chicago, Illinois; March 8, 2009.
19. Paszkiewicz, R; Bai, C; Arnold, MA; No more finger pokes for diabetics; Poster presentation at Research in the Capitol – Special Event at the Iowa State Capitol, Des Moines, Iowa; March 9, 2009.
20. Gibson, ER; Qiang, B; Olesberg, JT; Arnold, MA; Monitoring glycerol and methanol during *Pichia Pastoris* fermentations using near infrared spectroscopy; Poster presented at the 17th annual Center for Biocatalysis and Bioprocessing Conference; University of Iowa, Iowa City, IA; October 21, 2008.
21. Watkins, DL; Olesberg, JT; Boggess, T; Arnold, MA; Increased light extraction of InAsGaSb LED through wet chemical etching; Poster presented at the 17th annual Center for Biocatalysis and Bioprocessing Conference; University of Iowa, Iowa City, IA; October 21, 2008.
22. Peroza, CA; Arnold, MA; Net analyte signal enhancement of two-dimensional correlation spectroscopy of near infrared spectra of bovine serum albumin in aqueous solutions; Poster presented at the 17th annual Center for Biocatalysis and Bioprocessing Conference; University of Iowa, Iowa City, IA; October 21, 2008.

23. Alexeeva, NV; Arnold, MA; Near-infrared microspectroscopic analysis of rat skin tissue heterogeneity; oral presentation presented at the Midwest Regional Meeting of the American Chemical Society; October 10, 2008.
24. Bai, C; Arnold, MA; Analysis of noninvasive near infrared human baseline spectra; oral presentation presented at the Midwest Regional Meeting of the American Chemical Society; October 10, 2008.
25. Qian, J; Arnold, MA; Impact of temperature on PLS calibration models for glucose and urea in bovine blood ultrafiltrate; poster presentation presented at the Midwest Regional Meeting of the American Chemical Society; October 9, 2008.
26. Choi, J-Y; Miller, M; Arnold, MA; Digital micro-mirror array spectrometer for multivariate calibrations; poster presentation presented at the Midwest Regional Meeting of the American Chemical Society; October 9, 2008.
27. Alexeeva, N; Arnold, MA; Near infrared microspectroscopic analysis of rat skin tissue heterogeneity; oral presentation at the 10th Annual James F. Jakobsen Conference, University of Iowa, Iowa City, Iowa; March 29, 2008.
28. Negm, S; Arnold, MA; Mass transport of Sf-9 cells as a response to laser trapping; oral presentation presented at the Midwest Regional Meeting of the American Chemical Society; November 7, 2007.
29. Cho, DS; Olesberg, JT; Arnold, MA; Robust calibration models for on-line monitoring of urea during hemodialysis treatments; Oral presentation at Pittcon 2007; Chicago, Illinois; February, 2007.
30. Xiang, D; Miller, MJ; Olesberg, OT; Lin, W; Zhang, Z; Arnold, MA; Solid-state near infrared (NIR) spectrometer based on a digital micromirror array device (DMD) for *in vitro* measurement of glucose in binary mixtures; Oral presentation at the 232nd National Meeting of the American Chemical Society, San Francisco, CA; September 11, 2006.
31. Ren, M; Arnold, MA; Multivariate calibration models for glucose and urea in bovine blood ultrafiltrate with near infrared spectroscopy; Oral presentation at the 232nd National Meeting of the American Chemical Society, San Francisco, CA; September 11, 2006
32. Cho, DS; Olesberg, JT; Arnold, MA; Acoustic optical tunable filter (AOTF) spectrometer for on-line monitoring of urea during hemodialysis; Oral presentation at Pittcon 2006; Orlando, Florida; March 16, 2006.
33. Ren, M; Arnold, MA; Comparison of multivariate calibration models for glucose, urea and lactate from Raman and Near Infrared Spectra; Oral presentation at Pittcon 2006; Orlando, Florida; March 16, 2006.
34. Qui, J; Arnold, MA; Murhammer, D; On-line simultaneous cell density, glucose and lactate monitoring of *Trichoplusia ni* BTI-Tn-5B1-4 insect cell cultures with near infrared spectroscopy; Analysis and Pharmaceutical Quality section of the annual meeting of the American Associate of Pharmaceutical Scientists; November 7, 2005.
35. Liu, L; Olesberg, JT; Arnold, MA; Identification of glucose and urea spectral signatures in *in vivo* rat skin tissue with near infrared spectroscopy; Oral presentation at Pittcon 2005; Orlando, Florida; March 3, 2005.
36. Xiang, D; Lin, W; Arnold, MA; Diagnostic tools to characterize near-infrared spectra for multivariate analysis; Oral presentation at Pittcon 2005; Orlando, Florida; March 3, 2005.
37. Olesberg, JT; Cao, C; Veerasamy, S; Flatte, ME; Boggess, TF; Koerperick, EJ; Gundogdu, K; Olafsen, LJ; Santilli, M; Paper presented at symposium "Semiconductor photodetectors II," Opto-2005, Photonics West, SPIE, January 25, 2005
38. Olesberg, JT; Mermelstein, C; Schmitz, J; Wagner, J; Tunable laser diode system for noninvasive blood glucose measurements; Paper presented at symposium "Optical diagnostics and sensing V," Bios-2005, Photonics West, SPIE, January 26, 2005

RESEARCH GROUP

Current Group Members		
Name	Research Topic	Status
Jon Olesberg	NIR instrumentation for real-time biomedical analysis	Res Scien, 1999-Present
Natalia Alexeeva	Distinguishing cancer with near infrared spectroscopy	PhD 2011; Post-doc

Sherif Negm	Insect cell mobility with optical traps	PhD candidate
Joo-Young Choi	Selectivity for glucose in complex biological matrixes	PhD candidate
Deandrea Watkins	Noninvasive measurements of urea during hemodialysis	PhD candidate
Jue Qian	Noninvasive glucose measurements in awake rat model	PhD candidate
Ryan Smith	Temperature effects on noninvasive human spectra	PhD candidate
Han-Kyu NamKung	Terahertz spectra of solid materials	Visiting Scholar
Bimali Bandarananayake	Terahertz spectroscopy to follow single crystal solid-state reactions	PhD student
Yatian Sun	Noninvasive analysis in whole blood	PhD student
Madhuri Gundameedi	Terahertz spectroscopic measurements of solid materials	PhD student
Past Group Members		
Name	Research Topic	Degree/Year
May Ho	Biosensors based on sulfide electrode detection	none; 1983
Steve Lansing	Competitive binding assays	MS-; 1984
Teresa Keimig	Enzyme conformation homogenous immunoassays	none; 1984
Sally McCormick	Micro-column competitive binding assays	MS+; 1984
Michael Collison	Solvent isotope effects on enzyme electrodes	BS; 1984
Jim Fiocchi	Biosensors with mammalian organ acetone powders	BS; 1984
Michael Issaacson	Synthesis of affinity supports	HighScl; 1984
Stan Zisman	Transient selectivity of glass electrodes	SURF; 1984
Dean Kossives	Tissue based membrane electrodes	BS; 1984
Steve Baldwin	Novel biosensor configurations	BS; 1985
Dennis Hobson	Dynamic response of gas-sensing electrodes	BS; 1985
Keith Kline	Column mediated bio-affinity assays for enzymes	MS-; 1985
Tiffany Ostler	Fiber-optic ammonia sensors	SURF; 1985
Lina Hanania	Glutamate release from isolated retinal tissue	MS-; 1986
Orville Bunker	Computer interfaced enzyme kinetic assays	BS; 1986
Gilda Diaz	Acid etched optical fibers for chemical sensors	MS-;1986
Tim Nielsen	Instrumentation for internal enzyme biosensors	BS; 1986
Steve Hise	Acridium ester reaction chemistry	HighScl; 1987
Jim Ketoff	Porcine kidney-based glutamine biosensors	BS; 1987
Hillary Paul	Optimum pH for acridium ester luminescence	HighScl; 1987
Nozibele Tatanqu	Characterization of sensor dynamic response	BS; 1988
Sue Bitner	Anion selective membrane electrode chemistry	BS; 1989
Bonnie Walters	Internal enzyme biosensor for ethanol	MS-;1988
Scott Glazier	Phosphate ion-selective electrode development	PhD; 1988
Timothy Rhines	Optimization of fiber-optic ammonia sensors	PhD; 1988
Julie Wangsa	NADH-based fiber-optic biosensors	PhD; 1989
Maureen Kaltenbach	Luminescence detection schemes for glutamate	PhD; 1991
Todd Colin	Evanescence field fiber optics sensors	PhD; 1991
Satyajit (Bill) Kar	Fiber-optic ammonia sensors for neuroscience	PhD; 1992
Laura Azelborn	Complexation stoichiometry for phosphate electrodes	BS; 1990
Robert DeMeulenaere	Response mechanism of phosphate electrodes	MS+;1993
Ae-June Wang	Dual enzyme biosensors for synaptic glutamate	PhD; 1992
John Bersch	Enzyme-based fiber optic biosensors	BS; 1990
Becky Petsch	Fiber-optic gas sensor for hydrogen peroxide	BS; 1991
Paula Onsrud	Automated system for synaptic glutamate	none; 1991
Lois Marquardt	NIR spectroscopy of aqueous glucose measurements	MS-; 1993
Ed Branson	Hydrolysis kinetics of acridium esters	High Scl; 1992

Mary Pollard	NIR measurements of glucose in whole blood	SURF; 1993
Lin Li	Microscopic photon-counting system for glutamate	PhD; 1994
Michael Hayslett	Phosphate selective membrane electrodes	BS; 1994
Hoeil Chung	NIR spectroscopy for monitoring chemical processes	PhD; 1994
Krintine Poiser	Novel IR-based gas sensing probes	SURF; 1994
Shengtian Pan	Selectivity enhancement schemes for biosensors	PhD; 1995
Kevin Hazen	NIR measurements of glucose in biological fluids	PhD; 1995
Tia Ester	Indicators for solid-state ammonia sensors	SURF; 1995
Jose Zamora	Nitric oxide release kinetics	SURF; 1995
Xiangji Zhou	Luminescence and vibrational spectroscopic sensors	PhD: 1996
Ryanne Mayersak	Solid-state optical carbon dioxide sensors	MS+;1996
Glenn Goodrich	Automated system for fluoride measurements	BS; 1997
Lucretia Weber	RL-oxygen measurements in insect cell fermentors	BS; 1997
Scott Spear	Solid-state optical ammonia sensors for bioreactors	PhD; 1997
Mark Riley	NIR spectroscopy for bioreactor monitoring	Post-doc; 1997
Han Chuang	Self-powered radioluminescence oxygen sensors	Ph.D. 1997 Postdoc1998
Martin Rhiel	NIR monitors for rotating wall bioreactors	PhD 1998 (Chem. Eng.)
Geng Lu	Computational enhancement of NIR spectra	Ph.D. 1997 Postdoc 1998
Jason Burmeister	Noninvasive blood glucose monitors	Ph.D. 1997 Postdoc 1998
Taha Razek	Fiber optic chemical sensors for pollutants	Visiting student 1996-8
Barry Hu	NIR monitor for protein crystallization	Post-doc, 1998-9
Anna Helwig	Evaluation of Kromoscopy	PhD 1999
Hong Zhang	NIR bioreactor monitors for mammalian cells	MS+ 1999
Zac Steiner	On-line detection of methanol in fermentation media	BS; 2000
Greg Robinson	<i>In vitro</i> NIR models and comparison of spectral ranges	MS+ 2000
Shawna Patterson	Transverse push-pull microprobe for neurochemistry	MD/PhD 2001
Carolyn Green	NIR spectroscopic analysis in scattering media	PhD 2001
Sun Yu	Kromoscopic analysis of glucose	PhD 2001
Cristopher Eddy	NIR sensors for blood urea and proteins	PhD 2002
Julie Seeba	Radioluminescent sensors for oxygen and carbon dioxide	PhD 2002
Ben Armitage	<i>In vivo</i> blood glucose measurements	MS+ 2002
Su Chen	Instrumentation for NIR protein monitoring	MS- 2003
Jiang Qiu	Noninvasive monitors for rotating wall bioreactors	Postdoc, 2000-2002
Jan Mavri	Biosensors for metal ions	Visiting Student 2002
Winkenwerder, Jennifer	Laser tweezers for characterization of insect cells	PhD 2003
Mei-Jun Hei	NIR spectra of human interstitial fluid for glucose	MS- 2004
Jun Chen	<i>In vitro</i> models for NIR measurements of human subjects	PhD 2004
Yajun Zhu	NIR measurements of glucose in human interstitial fluid	MS- 2004
Airat Amerov	Noninvasive NIR and MIR spectroscopy for glucose	Postdoc 1999- 2005
Valerie Van Zee	Ultra-filtration probes for continuous glucose monitoring	MS- 2005
Dong Xiang	PCSA and DMD near infrared spectrometer	PhD 2006
Wenjiao Lin	Optical computing for noninvasive measurements	MS-, 2006
Zhiyu Yun	Glucose measurements in interstitial fluids	MS-, 2006
Lingzhi Liu	Animal model for noninvasive glucose measurements	PhD 2006
Tristan O'Toole	Instrumental stability and characterization	2006
Ivy Grimms	Effect of spectral resolution on net analyte signal	BS 2006
David Cho	Noninvasive measurement of urea for hemodialysis	PhD 2007
Min Ren	Near infrared and Raman glucose measurements	PhD 2007
Jessica Mutes	Noninvasive measurements of urea and lactate	MS 2008
Brandy Kleinheksel	Continuous monitor of glucose isomerase reaction	BS 2009

Jessica Jewett	ACE analyzer method for lactate measurements	BS 2009
Zhi Tian Tee	Accuracy of commercial pH buffer solutions	BS 2009
Becca Pashkeiwitz	Effect of skin color on noninvasive spectra	BS Honors 2009
Jaejin Kim	Selectivity of terahertz gas-phase spectra	Visiting Scholar 2009
Hoeil Chung	Miniaturized near infrared spectrometer	Sabbatical Leave 2009
Derek Thomas	Dehydrated skin protein model in noninvasive spectra	MS 2010
Carlos Peroza	Continuous monitoring of bioreactor systems	MS 2010
Chuannan Bai	Measuring glucose noninvasively in animal models	PhD 2010
Natalia Alexeeva	Distinguishing cancer with near infrared spectroscopy	PhD 2011