

Emanuel A. Waddell, Ph. D.

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Education

National Research Council Post-Doctoral Research Associate, January 2000-January 2002
Analytical Chemistry Division, National Institute of Standards and Technology (NIST)
Advisors: Laurie E. Locascio and Gary W. Kramer

Ph.D., Analytical Chemistry, May 2000 LSU, Baton Rouge, LA
Dissertation Advisor: Steven A. Soper

MS, Physical Chemistry, May 1995, University of Rochester, Rochester, NY
Advisors: Anne B. Myers and David G. Whitten

IBS, Chemistry and Physics, May 1991, Morehouse College, Atlanta, GA

Research Experience

Assistant Professor, Department of Chemistry, **University of Alabama in Huntsville**,
Huntsville, AL 08/04-Present

- Establishing laboratory for characterization and laser ablation of polymers
- Lectured Chemistry 101 (Fall 2004) and Quantitative Analysis (Spring 2005)

Assistant Professor, Department of Chemistry, **Morgan State University**, Baltimore, MD 01/02-07/04

- Attained ~\$500K in funding from the National Science Foundation, NASA, and the Henry and Camille Dreyfus Foundation for investigation of laser ablation of polymers
- Lectured General Chemistry (Majors, Non-Majors, and Honors) and Quantitative Analysis.
- Demonstrated capability of interfacing with other scientific researchers
- Directed undergraduate research

National Research Council Postdoctoral Associate, *Analytical Chemistry Division, Chemical Science and Technology Laboratory*, **NIST**, Gaithersburg, MD 1/00-1/02

- Developed and characterized laser ablation as a technique for the formation of channels in microfluidic devices.
- Characterized electroosmotic flow in laser ablated channels as a function of environmental parameters such as the atmosphere under which the ablation process occurs.
- Developed method of one-step fabrication and chemical modification for application to microfluidic and microarray technology.

Graduate Research Assistant, *Department of Chemistry*, **Louisiana State University**
Baton Rouge, LA 12/96-1/00

- Designed, constructed and characterized an integrated confocal scanning device for time correlated single photon counting of DNA microarrays.
- Characterized propagation of near infrared femtosecond light pulses through single-mode-optical fibers.

- Constructed a fiber optic based multichannel time correlated single photon counting device with sub-nanosecond time resolution for DNA sequencing devices. Characterization of fluorescence lifetimes of novel NIR dyes.

Graduate Research Assistant, *Department of Chemistry*, **University of Rochester**
Rochester, NY

5/94-7/96

- Investigated Stilbene and Azobenzene Derivatized Phospholipids and their formation of H-Aggregates via resonance Raman and absorption spectroscopy.

Graduate Research Assistant, *Department of Chemistry*, **Clark-Atlanta University**,
Atlanta, GA

9/92-8/93

- Utilized Diffuse Reflectance Fourier Transform Infrared Spectroscopy and Thermal Gravimetric Analysis to characterize dispersed organometallic complexes of Group II and VIIIB elements on inorganic oxides and their abilities to detoxify NO_x and SO₂ from flue gas emissions.

Professional Summer Intern, *Health and Environmental Labs* **Eastman Kodak Company**
Rochester, NY

6/92-9/92

- Conducted Biogrowth studies of effluent resulting from C-41 development process.
- Detected silver levels in effluent by High Pressure Liquid Chromatography.

Summer Technical Intern, *Battery Division and Integral Film Division* **Polaroid Corporation**
Waltham, MA

6/89-9/89
6/88-9/88

- Devised and tested methods for recycling reject batteries. Determined source of Mercury in wastewater stream.
- Analyzed quality control system for various product lines. Optimized system through utilization of statistical methods such as averaging and manipulation of confidence limits.

Teaching Experience:

Assistant Professor, *Department of Chemistry*
University of Alabama in Huntsville, Huntsville, AL

8/04-Present

- Instructor for General Chemistry 101. Responsible for introducing fundamentals of Chemistry to non-majors.
- Instructor for Quantitative Analysis (Chemistry 207).

Assistant Professor, *Department of Chemistry*
Morgan State University, Baltimore, MD

1/02-05/04

- Instructor for General Chemistry 101 and 102. Responsible for introducing fundamentals of Chemistry to majors and non-majors. (Including Honors Section)
- Instructor for Quantitative Analysis (Chemistry 207).

Teaching Assistant, *Department of Chemistry*
Louisiana State University, Baton Rouge, LA; **University of Rochester**, Rochester, NY
Clark-Atlanta University, Atlanta, GA; **Morehouse College** (*Physics*), Atlanta, GA

Various Dates

- Responsible for setup of laboratory experiments, writing of quizzes and evaluation of students in General Chemistry, Physical Chemistry, and Mechanics Laboratory.

- Led Problem Solving Sessions. Tutored students individually.

Book Chapters:

3. Waddell, Emanuel. “**Laser Ablation as a Fabrication Technique for Microfluidic Devices.**” Methods in Molecular Biology, Ed. S. D. Minter, Humana Press, St. Louis (in preparation).
2. Soper, Steven A.; Owens, Clyde V.; Lassiter, Suzanne J.; Xu, Yichuan; Waddell, Emanuel. “**DNA Sequencing Using Fluorescence Detection.**” Biomedical Photonics Handbook, Ed. T. Vo-Dinh, SPIE Press, Washington (2003).
1. Soper, Steven A.; Owens, Clyde; Lassiter, Suzanne; Xu, Yichuan; Waddell, Emanuel. **DNA Sequencing Using Fluorescence Detection.** Topics in Fluorescence Spectroscopy Vol 7 (DNA Technology), Ed. J. Lackowicz, Plenum Publishers (2003) 1-65.

Publications:

9. UV Laser Micromachining of Polymers for Microfluidic Applications, **Emanuel Waddell**, Laurie E. Locascio, and Gary W. Kramer, *Journal of the Association for Laboratory Automation*, **2002**, 7(1), 78-82
8. Control of Electroosmotic Flow in Laser Ablated and Chemically Modified Hot Imprinted Poly(ethylene terephthalate glycol) Microchannels, Alyssa C. Henry, **Emanuel Waddell**, Rubina Shreiner, and Laurie E. Locascio, *Electrophoresis*, **2002**, 23(5), 791-798.
7. Surface Characterization of Laser Ablated Polymers Used for Microfluidics, D.L. Pugmire, **E.A. Waddell**, R. Haasch, M.J. Tarlov, and L.E. Locascio, *Analytical Chemistry*, **2002**, 74(4), 871-878.
6. Chemical Mapping of Hot-Embossed and UV-laser-ablated Microchannels in Poly(methyl methacrylate) using Carboxylate Specific Fluorescent Probes. Timothy J. Johnson, **Emanuel A. Waddell**, Gary W. Kramer, Laurie E. Locascio, *Applied Surface Science*, **2001**, 181, 149-159.
5. High Resolution Near-IR Imaging of DNA Micro-arrays with Time-Resolved Acquisition of Fluorescence Lifetimes. **Emanuel Waddell**, Yun Wang, Wieslaw Stryjewski, Scott McWhorter, Allyssa Henry, D. Evans, Robin L. McCarley and Steven A. Soper, *Analytical Chemistry*, **2000**, 72(24), 5907-5917.
4. Time-Resolved Near-IR Fluorescence Detection in Capillary Electrophoresis. **Emanuel Waddell**, Suzanne Lassiter, Clyde V. Owens, Jr., and Steven A. Soper. *Journal of Liquid Chromatography and Related Technologies*, **2000**, 23(8), 1139-1158
3. A Fiber Optic-based Time Correlated Single Photon Counting Device with Subnanosecond time resolution. **Emanuel Waddell**, Wieslaw Stryjewski, and Steven A. Soper. *Review of Scientific Instruments*. **1999**, 70(1), 32-37.
2. Near Infrared Heavy-Atom-Modified Fluorescent Dyes for Base Calling in DNA-Sequencing Applications Using Temporal Discrimination. James H. Flanagan, Jr., Clyde V. Owens, Sarah E. Romero, **Emanuel Waddell**, Shaheer H. Kahn, Robert P. Hammer, and Steven A. Soper. *Analytical Chemistry*. **1998**, 70(13), 2676-2684.
1. Selective sulfur dioxide adsorbents prepared from designed dispersions of groups IA and IIA metal oxides on alumina. S. N. R. Rao, **Emanuel Waddell**, Mark E. Mitchell, and Mark G. White. *Journal of Catalysis*. **1996**, 163(1), 176-185.

Patents:

1. *"Chemical Modification of Substrates by Photo-Ablation under Different Local Atmospheres and Chemical Environments for the Fabrication of Microstructures"*. **Emanuel Waddell**, Timothy Johnson, Gary Kramer, and Laurie Locascio. (US Patent Serial Number 6,703,189)

Selected Presentations:

6. *"Laser Etching of Plastic Microfluidic Systems"*, Invited Speaker, Plenary Session, National Organization of Black Chemists and Chemical Engineers, New Orleans, LA. March 2002.
5. *"One-Step Laser Ablation and Surface Modification of Polymer Substrates for the Fabrication of Microfluidic Devices"*, Invited Speaker, SmallTalk Conference of the Association of Lab Automation, San Diego, CA. August 2001.
4. *"One-Step Laser Ablation and Surface Modification of Polymer Substrates for the Fabrication of Microfluidic Devices"* (Poster), National Organization of Black Chemists and Chemical Engineers National Conference, Baltimore, MD. April 2001.
3. *"Laser Ablation of Polymer Substrates for the Fabrication of Microfluidic Devices"* (Poster), National Meeting of the American Chemical Society, Washington, DC. August 2000.
2. *"A Novel Near-IR Time Correlated Single Photon Counting Scanning Device for DNA Sequencing Applications"*(Poster), Gordon Research Conference in Analytical Chemistry, New England College, Henniker, NH August 1999.
1. *"A Multi-Channel Fiber Optic Based Time Correlated Single Photon Counting Instrument for On-Line Lifetime Measurements in Capillary Electrophoresis"*(Talk), Pittsburgh Conference, New Orleans, LA. March 1998

