

# Eric E. Monson

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## Current Position

**Research Scientist** (9/06 – present) · **Research Associate** (9/02 – 8/06), Duke University Physics with Anna L. Lin.

Experimental and numerical studies of the signaling between neurons and glial cells using fluorescence imaging and nonlinear spatio-temporal pattern analysis.

## Education

**Postdoctoral Researcher**, University of Michigan Chemistry (9/99 – 8/02) with Raoul Kopelman.

Managed a large *National Cancer Institute, Unconventional Innovations Program* contract for early cancer detection and therapy using targeted, nanoparticle-based MRI contrast and photodynamic therapy agents.

**Ph.D. in Applied Physics**, University of Michigan, Ann Arbor (February 1999).

*Thesis title:* Nano-scale spatial and temporal fluorescence fluctuations in near-field microscopy, photobleaching recovery, and non-classical elementary reaction kinetics.

*Thesis advisor:* Raoul Kopelman, Kasimir Fajans Collegiate Professor of Chemistry, Physics and Applied Physics.

**S.B. in Physics**, Massachusetts Institute of Technology (June 1990).

## Research Interests & Background

Neuron/glia signaling patterns, diffusion-limited chemical reaction kinetics, live-cell fluorescence microscopy, intracellular ion sensors, lasers and optical instrumentation, NSOM, image processing, wavelet transforms, dimensionality reduction techniques, clustering, Markov models, electron microscopy, numerical integration of neuron and reaction-diffusion simulations.

## Teaching

Taught introductory chemistry lab sections (Fall 1995 – Winter 1997).

Milton Tamres Outstanding Teaching Award (1997).

Rackham Graduate School Outstanding Graduate Student Instructor Award (1997).

## Publications

### JOURNAL ARTICLES

AJ Catllá, DG Schaeffer, TP Witelski, EE Monson & AL Lin, “On Spiking Models for Synaptic Activity and Impulsive Differential Equations”, *SIAM Review* (submitted).

AC Horton, B Rácz, EE Monson, AL Lin, RJ Weinberg & MD Ehlers (8 Dec 2005) “Polarized Secretory Trafficking Directs Cargo for Asymmetric Dendrite Growth and Morphogenesis”, *Neuron* **48**, 757–771.

E Monson & R Kopelman (2004) “Non-Classical Kinetics of an Elementary  $A + B \rightarrow C$  Reaction-Diffusion System Showing Effects of a Speckled Initial Reactant Distribution and Eventual Self-Segregation: Experiments”, *Phys. Rev. E* **69** (2), 021103.

H Xu, F Yan, EE Monson, & R Kopelman (2003) “Room-temperature preparation and characterization of poly (ethylene glycol)-coated silica nanoparticles for biomedical applications”, *J. Biomed. Mater. Res. Part A* **66A**, 870–879.

MJ Moreno, E Monson, RG Reddy, A Rehemtulla, BD Ross, M Philbert, RJ Schneider & R Kopelman (2003) “Production of singlet oxygen by  $\text{Ru}(\text{dpp}(\text{SO}_3)(2))(3)$  incorporated in polyacrylamide PEBBLES”, *Sens. Actuator B-Chem.* **90**, 82–89.

JP Sumner, JW Aylott, E Monson & R Kopelman (2002) “A fluorescent PEBBLE nanosensor for intracellular free zinc”, *Analyst* **127**, 11–16.

- NK Kerner, B Black, E Monson & L Meeuwenberg (2002) "Training Instructors to Facilitate Collaborative Inquiry", *J. Student Centered Learning* **1**, 29–36.
- E Monson & R Kopelman (2000). "Observation of laser speckle effects and nonclassical kinetics in an elementary chemical reaction", *Phys. Rev. Lett.* **85**, 666–669.
- HA Clark, SLR Barker, M Brasuel, MT Miller, E Monson, S Parus, ZY Shi, A Song, B Thorsrud, A Kopelman, A Ade, W Meixner, B Athey, M Hoyer, D Hill, R Lightle & MA Philbert (1998) "Subcellular optochemical nanobiosensors: probes encapsulated by biologically localised embedding (PEBBLES)", *Sens. Actuator B-Chem.* **51**, 12–16.
- G Merritt, E Monson, E Betzig & R Kopelman (1998) "A compact near-field scanning optical microscope", *Ultramicroscopy* **71**, 183–189.
- G Merritt, E Monson, E Betzig & R Kopelman (1998) "A compact fluorescence and polarization near-field scanning optical microscope", *Rev. Sci. Instrum.* **69**, 2685–2690.
- AL Lin, E Monson & R Kopelman (1997) "Nonclassical dimension-dependent kinetics of a photobleaching reaction in a focused laser beam 'phototrap'", *Phys. Rev. E* **56**, 1561–1566.
- M Shortreed, E Monson & R Kopelman (1996) "Lifetime enhancement of ultrasmall fluorescent liquid polymeric film based optodes by diffusion-induced self-recovery after photobleaching", *Anal. Chem.* **68**, 4015–4019.
- E Monson, G Merritt, S Smith, JP Langmore & R Kopelman (1995) "Implementation of an NSOM System for Fluorescence Microscopy", *Ultramicroscopy* **57**, 257–262.

#### BOOK CHAPTERS

- E Monson, M Brasuel, MA Philbert & R Kopelman (2003) "PEBBLE Nanosensors for *in vitro* Bioanalysis", in T Vo-Dinh (ed.) *Biomedical Photonics Handbook*. CRC Press, Boca Raton, FL, 59.1–59.14.
- M Brasuel, R Kopelman, MA Philbert, JW Aylott, HA Clark, I Kasman, M King, E Monson, JP Sumner, H Xu, M Hoover, TJ Miller & R Tjalkens (2002) "PEBBLE Nanosensors for Real Time Intracellular Chemical Imaging", in F Ligler, C Rowe-Tait (eds.) *Optical Biosensors: Present and Future*. Elsevier, Amsterdam, 407–536.

#### CONFERENCE PROCEEDINGS

- H Xu, F Yan, E Monson, W Tang, R Kopelman, RJ Schneider & MA Philbert (2002) "Preparation and Characterization of Poly(ethylene-glycol)-Coated Stöber Silica Nanoparticles for Biomedical Applications", *SPIE (Int. Soc. Opt. Eng.)*, 383–393.
- T Horvath, E Monson, JP Sumner, H Xu & R Kopelman (2002) "Use of Steady-State Fluorescence Anisotropy with PEBBLE Nanosensors for Chemical Analysis", *SPIE (Int. Soc. Opt. Eng.)*, 486–492.
- E Monson & R Kopelman (2001) "Observation of Laser Speckle Effects in an Elementary Chemical Reaction", in JM Drake, J Klafter, PE Levitz, M Urbach (eds.) *Materials Research Society Symposium*, Boston, MA, T7.27.21–T27.27.26.
- E Monson, AL Lin & R Kopelman (1996) "The anomalous diffusion-limited reaction kinetics of a phototrapping reaction", *Materials Research Society Symposium*, Boston, MA.
- R Kopelman, E Bakker, E Monson, G Merritt, Z Rosenzweig, M Shortreed, S Parus, S Smith, T Fox, A Song, W Tan, Y Chen & ZY Shi (1995) "Ultra-Small Fiberoptic Chemical and Biochemical Sensors", *Abstr. Pap. Am. Chem. Soc.* **210**, 13–MTLS.

#### PATENTS

- J Anker, E Monson, R Kopelman & MA Philbert (2003) "Modulated Chemical Sensors", *Patent Application No. 10/419,033*, Regents of the University of Michigan, USA.
- R Kopelman, HA Clark, E Monson, S Parus, MA Philbert & B Thorsrud (2002) "Optical fiberless sensors", *US Patent No. 6,379,955*, Regents of the University of Michigan, USA.
- R Kopelman, HA Clark, E Monson, S Parus, MA Philbert. & B Thorsrud (2000) "Optical fiberless sensors for analyzing cellular analytes", *US Patent No. 6,143,558*, Regents of the University of Michigan, USA.