
Christina M. Othon

Assistant Professor of Physics
Wesleyan University
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Education

December 2005 PhD Physics, Univ. of Nebraska-Lincoln “*Switching Dynamics of Ferroelectric Langmuir-Blodgett Copolymer Films*”

May 2002 MS Physics, Univ. of Nebraska-Lincoln

May 2000 BS Double Major: Physics and Astronomy, Univ. of Iowa

Employment

Assistant Professor of Physics, July 2010-present Department of Physics, Wesleyan University, Middletown CT.

Postdoctoral Scholar, 2007-2010 California Institute of Technology with Prof. Ahmed H. Zewail, Physical Biology Center for Ultrafast Science and Technology, Pasadena, CA.

National Research Council Postdoctoral Research Associate, 2006-2007 Naval Research Laboratory Dr. Bradley Ringeisen, Chemistry Department, Washington D.C.,

Graduate Research Assistant, 2001-2005 University of Nebraska-Lincoln Prof. Stephen Ducharme, Dept. Physics and Astronomy, Lincoln, NE.

Personal Statement

Investigating protein-solvent interactions using ultrafast spectroscopic techniques. I use ultrafast fluorescence spectroscopy to investigate changes in protein-solvent interactions during protein structural transitions as well as charge transfer and hydration dynamics in molecular systems. In collaboration with other groups, we are modifying the electrostatic and hydrodynamic properties small molecular osmolytes. This has provided critical insight into the importance of the hydration layer to protein conformational stability as well as the behavior of fluorophilic molecules in biological systems.

Membrane dynamic association. Biological lipid membranes are inherently dynamic which is essential to their ability to adapt to new particle insertion, for the sorting of membrane proteins, and for recycling material within the structure. Dynamic models, such as the lipid raft model, suggest that the nanoscale heterogeneity of lipid structures and dynamics function to drive protein sorting and self-assembly. We have observed a non-exponential reorientation correlation, indicating the presence of dynamic clusters using time-resolved fluorescence microscopy. These clusters could represent a new physical feature responsible for controlling the rate of protein insertion and self-assembly in the cellular membrane.

Honors

2006 National Research Council Postdoctoral Research Associateship

2001 Student Assistantship in Research Scholarship (STARS)

2000 Richard H. Larson Fellowship

1996-2000 Opportunity at Iowa Scholar

Teaching, Mentoring, and University Service

Wesleyan University Courses Taught

- Phys313 Classical Dynamics-Spring2014
- Phys518 Molecular Biophysics Journal Club Spring 2014
- FGSS420 Women of Color in STEM Student Forum
- Phys113 General Physics I- Fall 2013 & 2014 implement a course overhaul and the introduction of problem based learning sections.
- Phys316 Thermal and Statistical Physics- Spring 2011, 2012, 2013
- Phys2Chaos-Fall 2011, 2012
- Phys342 Experimental Optics – Fall 2010, 2011
- Phys505 Advanced Topics in Condensed Matter Physics – Fall 2010

Mentoring at Wesleyan

- Present Graduate Students: Neda Dadshvand, Nimesh Shukla, Eduardo Vega-Lozada
- Present Undergraduate Research Students: Lee Chen, Inha Cho, LaNell Williams, Wyatt Rees, Amardeep Keshiri
- Past Graduate Students: Mohsin Naqvi
- Past Undergraduate Research Students: Nora Dumont, Felix Schupp, Benjamin Merkt, Julian Heusser, and Oscar Takabwira
- Faculty advisor for McNair Scholar-LaNell Williams

University Service, Committees, and Outreach:

- WesMASS and Women of Color in STEM student forum Faculty Advisor
- Local Organizing Committee Chair and National Organizing Committee member for APS 2016 Conference for Undergraduate Women in Physics
- Co-Founder and faculty participant in *Girls in Science Summer Camp* at Green Street Arts Center
- Currently Academic Advisor to 29 students
- Wesleyan University Laser Safety Officer 2010-Present

Research Grants

“Regulating Protein Stability in Microgravity Environments” Faculty Collaborative Grant, CT Space Grant Consortium, \$12,000 (2014). Active 1/1/2014-12/31/2014

“Fluorescence Recovery After Photobleaching for Measurement of Lipid Lateral Diffusion”, Wesleyan Grants in Support of Scholarship Project Grant, amount approved \$3000. (2014)

“Osmoregulation for Microgravity Environments” CT Space Grant Consortium, \$20,000. (2012)

“Imaging Detector for Fluorescence Microscope” Wesleyan Grants in Support of Scholarship, amount approved \$2500. (2011)

“WideField Fluorescence Microscope for the Study of Membrane Morphology and Dynamics” Wesleyan Grants in Support of Scholarship, amount approved \$2500. (2010)

Ocean Optics Educational Grant, amount approved \$1800, provided a 10% discount on a UV-vis/Fluorescence spectrometer. (2010)

Departmental Start-up Grant, Wesleyan University, Othon (PI) 07/01/2010 Research Initiation Funds. The purpose of this grant is to set up the PI's laboratory and fund preliminary studies needed to collect data in order to compete for extramural research support.

Teaching and Community Outreach Grants

"Girls in Science Summer Camp" Petit Foundation, \$10,000 Sara MacSorely (lead administrator) (2014).

"Improving Under-represented Minority and Women Participation in Physics", Wesleyan Grants in Support of Scholarship Teaching and Pedagogy Grant, \$1000 (2013), allowed the hiring of 8 dedicated course assistants to lead problem based learning sessions.

Publications and Presentations

1. N. Dadashvand, L. A. Williams, **C. M. Othon**, *"Heterogeneous rotational diffusion of a fluorescent probe in lipid monolayers"*, *Structural Dynamics*, **1**, 054701 (2014); doi: 10.1063/1.4894379.
2. L. Chen, N. Shukla, I. Cho, E. Coh, E. A. Taylor, **C. M. Othon**, *"Sucralose Destabilization of Protein Structure"*, under review.
3. **C. M. Othon**, E. Pomarico, N. Shukla, M. Bouduban, M. Chergui, *"Water Structuring and Retardation of Hydrogen-bonding Dynamics by Disaccharide Osmolytes"*, in preparation.
4. B. R. Ringeisen, **C. M. Othon**, U.S. Patent No. **8,101,247**, *Sub-Micron Laser Direct-Write*, (2012).
5. **C. M. Othon**, S. Ducharme, *"Polarization patterning by laser-induced phase change in ferroelectric polymer films"*, *Applied Physics A*, **104** 727-731 (2011).
6. B. R. Ringeisen, **C. M. Othon**, X. Wu, D. B. Krizman, M. M. Darfler, J. J. Anders, and P. K. Wu, *"Biological Laser Printing (BioLP) for High resolution Cell Deposition"*, *Cell and Organ Printing*, Springer, New York, Eds. B. R. Ringeisen, B. J. Spargo, and P. K. Wu (2010).
7. T. H. Yoo, O.-H. Kwon, **C. M. Othon**, J. Van Deventer, D. Tirrell, A. H. Zewail, *Hydration Dynamics at Fluorinated Protein Surfaces*, *Proceedings of the National Academy of Sciences* **107** 17101-17106 (2010).
8. **C. M. Othon**, O.-H. Kwon, M. M. Lin, A. H. Zewail, *Solvation in protein (un)foldings: Effect of local and bulk dynamics in the melittin tetramer-monomer transition*, *Proceedings of the National Academy of Sciences* **106** 12593-12598 (2009).
9. O. F. Mohammed, O.-H. Kwon, **C. M. Othon**, A. H. Zewail, *Charge Transfer Assisted by Collective H-Bonding Network Dynamics*, *Angewandte Chemie International Edition* **48** 6251-6256 (2009).
10. B. Ringeisen, **C. Othon**, J. Barron, P. Wu, *The Evolution of Cell Printing*, *Fundamentals of Tissue Engineering and Regenerative Medicine* 613-631 (2009).
11. **C. M. Othon**, A. Laracuenta, H. D. Ladoucuier, B. R. Ringeisen, *Sub-Micron Parallel Laser Direct-Write*, *Applied Surface Science* **255** 3407-3413 (2008).

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12. **C. M. Othon**, J. Kim, S. Ducharme, V. M. Fridkin, *Switching Kinetics of Ferroelectric Nanomesas*, Journal of Applied Physics **104** 054109 (2008). Featured in the Virtual Journal of Nanoscale Science and Technology **18**, issue 12.
 13. **C. M. Othon**, X. Wu, J. J. Anders, B. R. Ringeisen, *Single-cell printing to form three-dimensional lines of olfactory ensheathing cells*, Biomedical Materials **3** 034101 (2008).
 14. B. R. Ringeisen, J. A. Barron, D. Young, **C. M. Othon**, H. D. Ladoucuier, P. K. Wu, B. J. Spargo. “*Laser Printing Cells*”, *Virtual Prototyping & Bio Manufacturing in Medical Applications*, Springer, New York, Eds. Bopaya Bidanda and Paulo Bartolo (2007).
 15. B. R. Ringeisen, **C. M. Othon**, J. A. Barron, H. D. Young, and B. J. Spargo, *Jet-based methods to print living cells*, Biotechnology Journal **1**, 930-948 (2006).
 16. K. Kraemer, A. Sorokin, **C. Othon**, S. Ducharme, and V. Fridkin, *The effects of humidity on the dielectric response in ferroelectric polymers made by Langmuir-Blodgett deposition*, Ferroelectrics, Letters Section **32**, 85-89 (2005).
 17. S. Ducharme, T. J. Reece, **C. M. Othon**, and R. K. Rannow, *Ferroelectric Polymeric Langmuir-Blodgett Films for Non-Volatile Memory Applications*, IEEE Transactions on Device and Materials Reliability, **5**, 720-735 (2005).
 18. **C. M. Othon**, F. B. Bateman, and S. Ducharme, *Effects of electron irradiation on the ferroelectric properties of Langmuir-Blodgett copolymer films*, Journal of Applied Physics **98**, 14106-14112 (2005).
 19. **C. M. Othon** and S. Ducharme, *Electron Irradiation Effects on Ferroelectric Copolymer Langmuir-Blodgett Films*, Ferroelectrics **304**, 9-12 (2004).
 20. P. A. Jacobson, L. G. Rosa, **C. M. Othon**, K. Kraemer. A. V. Sorokin, S. Ducharme, and P. A. Dowben, *Water absorption and dielectric changes in crystalline poly(vinylidene fluoride-trifluoroethylene) copolymer films*, Applied Physics Letters **84**, 88-92 (2004).

Invited Talks:

“*Sucralose Destabilization of Protein Structure*” APS March Meeting Press Conference and Webcast (March 2015)

“*Manipulating Protein Stability Through Solvent Dynamics*” École polytechnique fédérale de Lausanne (March 2014)

“*Solvent Dynamics: Governing Structure in Biological Systems*” Queens College (March 2012)

“*Solvent Dynamics: Governing Structure in Biological Systems*” Southern Connecticut State University (November 2011)

“*Solvent Dynamics: Governing Structure in Biological Systems*” University of Iowa (October 2011)

“*Ultrafast Solvation: Investigating Molecular Forces in Protein Folding*” Trinity College (November 2010)

“*Investigating Molecular Forces at the Protein Surface*”, University of Wisconsin-Eau Claire (February, 2010)

“Ultrafast Solvation: Investigating Molecular Forces in Protein Folding” Wesleyan University (January, 2010)

“Laser Processing From Nanotech to Neurology” University of Nebraska Lincoln MRSEC Symposium (February 2007)

“Laser Processing From Nanotech to Neurology” Wayne State University (February 2007)

“Laser Processing From Nanotech to Neurology” University of Wisconsin-Stevens Point (March 2007)

Presentations:

- APS March Meeting, San Antonio March 2015
- 2nd International Conference on Physics and Biological Systems Gif-Sur-Yvette France 2014
- Soft Condensed Matter GRC, New London July 2013
- Biophysical Society, Philadelphia February 2013
- Biophysical Society, San Francisco February 2012
- Wesleyan NSM lunch series, October 2010
- Materials Research Society Spring, San Francisco 2007
- NRL/NRC Symposium 2006
- Biomedical Engineering Society Annual Meeting, Chicago 2006
- International Conference for Biotechnology and Nanotechnology, Santa Barbara 2006
- Materials Research Society Fall, Boston 2005
- Fundamental Ferroelectrics, Williamsburg 2004
- European Ferroelectrics Conference, London 2004
- Sigma Xi Graduate Research Competition 2004
- Sigma Xi Graduate Research Competition 2001

Journal Reviewer:

- Journal of Physical Chemistry
- Journal of American Chemical Society
- Journal of Applied Physics
- Applied Physics Letters