

Laura B. Sagle

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Department of Chemistry
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EDUCATION AND ACADEMIC CAREER

Assistant Professor of Chemistry, Physical Chemistry 2012-Present
Division, The University of Cincinnati

Current Research Areas:

- Protein-nanoparticle devices for improved LSPR biosensing
- Development of improved, biologically compatible SERS and LSPR substrates
- Benchtop methods for nanofabrication at the sub 20 nm level (for single biomolecule applications)

Postdoctoral Research Associate, Northwestern 2009-2012
University, Evanston, IL
Research Topic: *Single Nanoparticle LSPR And Tracking*
Supervisor: Prof. Richard Van Duyne

Postdoctoral Research Associate, Texas A&M 2006-2009
University, College Station, TX
Research Topic: *Molecular Level Mechanism Of Protein Stabilizers And Denaturants*
Supervisor: Prof. Paul Cremer

Post-Graduate Studies: University of California, San Diego Ph.D. Awarded 2006
Thesis: *Carbon-Deuterium Bonds As Infrared Probes For Protein Dynamics And Folding*
Supervisor: Prof. Floyd Romesberg

Undergraduate Studies: University of California, Santa Cruz B. S. Awarded 1996

RESEARCH FUNDING

Funding As PI

Current Support

2014 UC LEAF SEED Grant Award
"Novel Nanoparticle Arrays For Improved Biosensing"
Amount: \$3,000 for 1 year.

2014 UC Renewable Energy Program
"Renewable Energy Storage Devices Using Renewable Materials"
Amount: \$208,000 total to be shared amongst 5 groups: Steckl, Shanov, Gutmark, Heineman and Sagle for 1 year.

2013-14 Harriett G. Jenkins Graduate Fellowship Program (NASA Fellowship),
Student: Jendai Robinson, PI: Laura Sagle
"The Fabrication and Characterization of Nanoporous Alumina: A Pilot Project"
Amount: \$90,000 for 2 years.

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Pending Support

- 2014 Marion Milligan Mason Award For Women In The Chemical Sciences
"Enabling Single Molecule Biophysical Surface Enhanced Raman Spectroscopy (SERS) Measurements Using Novel Substrates"
Amount: \$50,000 over 1 year
- 2014 National Science Foundation, Chemical Measurement and Imaging (CMI) Division
"Development Of Novel Plasmonic Platforms For The Detection Of Membrane-Associated Events"
Amount: \$399,508 over 3 years

TEACHING

Classes

Student Evaluations

Fall 2012, "Survey Of Physical Chemistry" (Chem 3010)	4.5/6.0
Fall 2013, 2014 "Survey Of Physical Chemistry" (Chem 3010)	4.7/6.0
Fall 2013, 2014 "Physical Chemistry Laboratory" (Chem 3020L)	5.2/6.0

RESEARCHERS AND STUDENTS

Current Postdoctoral Research Associates

Dr. Debrina Jana (2013-present)

Biologically Compatible SERS Substrates, Chemical Methods For Improved LSPR Biosensing, Improved LSPR Biosensing Substrates

Current Graduate Students Advised

Ian Bruzas (2014-present)

Biologically Compatible SERS Substrates

Jendai Robinson (2014-present)

Plasmonic Nanorod Arrays

Sarah Unser (2013-present)

Protein-nanoparticle biosensing devices

Jie He (2013-present)

Improved SERS and LSPR Substrates

William Lum (2014-present)

Nanofabrication and Protein Patterning

Zohre Gorunmez, Co-Advisor with Prof. Tom Beck (2013-present)

Calculations of Field Intensities for Core-Shell Structures

Undergraduate Students Advised

Truc Nyugen (Spring, 2015), Muriel Lemaitre (Spring, 2015), Michelle Boegli (Spring, 2015), Kevin Ma (Spring, 2015), George Yoshida (Spring, 2015), Melissa Kelley (2014-2015), ReJeana Cary (2014-2015), Hannah Schwab (2014-2015), Emily Lehnhoff (2014-2015), Sophia Melynsk (Summer, 2014), William Lum (2012-2014), Ian Campbell (2013-2014), Jason Schultz (2013-2014), Meredith Decoy (Spring, 2014), Ryan Narro (Spring, 2014), Ronald Apke (Spring, 2014), Jenifer Hatch (Summer and Fall, 2013), Carlos Matti (Summer, 2013), Bansari Patel (Fall, 2013), Jessica Tommie (Spring, 2013), James Barnett (Spring, 2013)

CURRENT ACADEMIC COLLABORATORS

Prof. Tom Beck, Department of Chemistry, University of Cincinnati

Laura B. Sagle

Prof. Andrew Steckl, Department of Electrical And Computer Engineering, University of Cincinnati
Prof. Vesselin Shanov, Department of Chemical and Materials Engineering, University of Cincinnati
Prof. Peixin Guo, Department of Pharmaceutical Sciences, University of Kentucky
Prof. Frank Perris, Department of Physics, Kenyon College
Prof. Katherine Cimatu, Department of Chemistry and Biochemistry, Ohio University

SERVICE CONTRIBUTIONS

Member of the Department of Chemistry Admissions Committee	2012-present
Member of the Department of Chemistry Morale Committee	2012-present
Member or Chair of Ph.D. and Oral Thesis Student Committees (15 students)	2013-present
Member or Chair of Undergraduate Capstone Student Committees (5 students)	2012-present
Guest Lecturer for Chemistry 7022, Graduate Thermodynamics	Fall, 2012
Invited Departmental Colloquia Speakers	2012-present
Prof. So-Jung Park, University of Pennsylvania	
Research Prof. Leo Breydo, University of South Florida	
Dr. Jessica Koehne, NASA-AMES Research Facility	
Prof. Sara Skrabalak, Indiana University	
Prof. Peter Kruse, McMaster University	

PROFESSIONAL AFFILIATIONS AND SERVICE

Member, American Chemical Society (1997-present)
Member, Biophysical Society (1999-present)
Member, Protein Society (2004-present)
Session Chair, Ralph and Helen Oesper Symposium, The University of Cincinnati (Fall, 2013)
Panel Participant, New Faculty Institute Orientation (Fall, 2013)
Wrote Letters of Recommendation for 14 undergraduate students for various graduate and professional programs

Manuscript Reviewer for *Journal of the American Chemical Society*, *NanoLetters*, *Journal of Physical Chemistry C*, *Journal of Nanoparticle Research*, *Journal of Raman Spectroscopy*, *New Journal Of Chemistry*

PEER-REVIEWED PUBLICATIONS

Jana, Debrina, Matti, Carlos, Patel, Bansari, He, Jie, and **Sagle, Laura**, "Capping Agent-Free Gold Nanostars Show Greatly Increased Versatility And Sensitivity For Biosensing" *Analytical Chemistry*, *under review*.

Debrina Jana, Sarah Unser, Ian Bruzas, and **Laura Sagle**, "Noble Metal Nanoparticles To Probe And Alter Biological Response" World Scientific Press, London, England, *In Press*. This book chapter will be part of the book entitled: "Noble Metal Nanoparticles For Biomedical Applications".

Sarah Unser, Ian Campbell, Debrina Jana, and **Laura B. Sagle**, "Direct Glucose Sensing in the Physiological Range Through Plasmonic Nanoparticle Formation" *Analyst*, **2015**, 140(2), 590-599.

Sagle, Laura B., Bingham, J. B., Ruvuna, Laura K., Liu, C., Cremer, P. S., and Van Duyne, R. P., "Single Nanoparticle Tracking of Solid Supported Lipid Bilayers Containing GM1" *Journal of the American Chemical Society*, **2012**, 134(38) 15832-15839.

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Abrencia, Maria Victoria, **Sagle, Laura B.**, and Van Duyne, R. P., "Towards Multiplexed Single Nanoparticle Localized Surface Plasmon Resonance Biosensing" *Nanoscope: The Journal of Undergraduate Research in Nanoscience*, **2011**, 8(1) 8-13.

Sagle, Laura B., Ruvuna, Laura K., Ruemmele, Julia A., and Van Duyne, R. P., "Advances in Localized Surface Plasmon Resonance Biosensing" *Nanomedicine*, **2011**, 6(8) 1447-1462.

Sagle, L. B., Cimatú, K., Litosh, V. A., Liu, Y., Flores, S., Chen, X., Yu, B., and Cremer, P. S., "The Methyl Groups of Trimethylamine N-oxide (TMAO) Orient Away From Hydrophobic Interfaces" *Journal of the American Chemical Society*, **2011**, 133(46) 18707-18712.

Cho, Younhee, **Sagle, Laura**, Imura, Satoshi, Zhang, Yanjie, Kherb, Jaibir, Chilkoti, Ashutosh, Scholtz, J. Martin, and Paul S. Cremer, "Hydrogen Bonding of β -Spiral Structure is Stabilized in D_2O " *Journal of the American Chemical Society*, **2009**, 131(42) 15188-15193.

Sagle, Laura B., Zhang, Yanjie, Litosh, Vladislav, Chen, Xin, Cho, Younhee and Cremer, Paul S., "Investigating the Hydrogen Bonding Model of Urea Denaturation", *Journal of the American Chemical Society*, **2009**, 131(26) 9304-9310.

Cho, Younhee, Zhang, Yanjie, Carlson, Kim, **Sagle, Laura**, Chilkoti, A., and Cremer, P. S., "Effects of Hofmeister Anions on the Phase Transition Temperature of Elastin-Like Polypeptides" *Journal of Physical Chemistry B*, **2008** 112(44) 13765-13771.

Chen, Xin, **Sagle, Laura B.**, and Cremer, Paul S., "Urea Orientation at the Protein Surface" *Journal of the American Chemical Society*, **2007** 129(49) 15104-15105.

Zhang, Yanjie, Furryk, Steven, **Sagle, Laura B.**, Cho, Younhee, Bergbreiter, David E. and Cremer, Paul S., "Effects of Hofmeister Anions on the LCSTs of PNIPAM as a Function of Molecular Weight" *Journal of Physical Chemistry C*, **2007**, 111(25), 8916-8924.

Weinkam, Patrick, Zimmermann, Jörg, **Sagle, Laura B.**, Matsuda, Shigeo, Dawson, Philip E., Wolynes, Peter G. and Romesberg, Floyd E., "Characterization of the Alkaline Transitions in Ferricytochrome *c* Using Carbon-Deuterium Infrared Probes" *Biochemistry*, **2008**, 47(51), 13470-13480.

Sagle, Laura B., Zimmermann, Jörg, Dawson, Philip E., and Romesberg, Floyd E., "Direct and High Resolution Characterization of Cytochrome *c* Equilibrium Folding" *Journal of the American Chemical Society*, **2006**, 128(44), 14232-14233.

Sagle, Laura B., Zimmermann, Jörg, Matsuda, Shigeo, Dawson, Philip E., and Romesberg, Floyd E., "Redox-Coupled Dynamics and Folding in Cytochrome *c*" *Journal of the American Chemical Society*, **2006**, 128(24), 7909-7915

Creameens, Matthew E., Fujusaki, Hiroshi, Zhang, Yong, Zimmermann, Jörg, **Sagle, Laura B.**, Matsuda, Shigeo, Dawson, Philip E., Straub, John E., and Romesberg, Floyd E., "Efforts Toward Developing Direct Probes of Protein Dynamics" *Journal of the American Chemical Society*. **2006**, 128(18), 6028-6029.

Sagle, Laura B., Zimmermann, Jörg, Dawson, Philip E., and Romesberg, Floyd E., "A High Resolution Probe of Protein Folding" *Journal of the American Chemical Society*. **2004**, 126(11), 3384-3385.

Paddock, M.L., **Sagle, L.**, Tehrani, A., Beatty, J.T., Feher, G., Okamura, M. Y., "Mechanism of Proton Transfer Inhibition by Cd^{2+} Binding to Bacterial Reaction Centers: Determination of the pK_a of Functionally Important Histidine Residues" *Biochemistry*. **2003**, 42(32), 9626-9632.

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Adelroth, P; Paddock, ML; **Sagle, LB**; Feher, G; Okamura, MY, "Identification of the Proton Pathway in Bacterial Reaction Centers: Both Protons Associated with Reduction of Q(B) to Q(B)H(2) Share a Common Entry Point" *Proceedings of the National Academy of Sciences of the United States of America*. **2000**, 97(N24), 13086-13091.

Goldbeck, RA; **Sagle, L**; KimShapiro, DB; Flores, V; Kliger, DS, "Evidence for Heme-Heme Excitonic Coupling in the Soret Circular Dichroism of Hemoglobin" *Biochemical and Biophysical Research Communications*. **1997**, 235(N3), 610-614.

PROVISIONAL PATENTS

Laura Sagle and Sarah Unser, 2013

"Colorimetric Glucose Sensing With Collagen-Nanoparticle Networks"

Laura Sagle, Haohan Zhao, and William Lum, 2013

"Nano-Patterning By Hole-Mask Colloidal Lithography"

INVITED PRESENTATIONS FROM THE UNIVERSITY OF CINCINNATI

NASA, Moffet Field, CA, Biosensing Division, April 2014

"Improved Localized Surface Plasmon Resonance Biosensing", oral presentation

Wright State University, Dayton, OH, Chemistry Department, April 2014

"Improved Localized Surface Plasmon Resonance Biosensing", oral presentation

Ohio University, Athens, OH, Chemistry Department, April 2014

"Improved Substrates For Plasmonic And SERS Applications", oral presentation

University of Cincinnati, Physics Departmental Colloquia, February 2013

"Biophysics At The Lipid-Water Interface And Beyond", oral presentation

Rose-Hulman University, Terra Haute, IN, Chemistry Department, January 2013

"Protein Patterning Using Colloidal Lithography", oral presentation

STUDENT PRESENTATIONS

Haohan Zhao, William Lum, and Laura Sagle

Fall National ACS conference, Indianapolis, September 2013 and Oesper Symposium, University of Cincinnati, October 2013, poster presentation

"Nano-Patterning By Hole-Mask Colloidal Lithography"

Sarah Unser, Jenifer Hatch, Ian Campbell, and Laura Sagle

Fall National ACS conference, Indianapolis, September 2013 and Oesper Symposium, University of Cincinnati, October, 2013, poster presentation

"Plasmonic Glucose Sensing With Collagen-Nanoparticle Arrays"

Debrina Jana, Jie He, and Laura Sagle

Fall National ACS conference, Indianapolis, September 2013, and Oesper Symposium, University of Cincinnati, October 2013, poster presentation

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"Probing The Inside Of Core-Shell Nanoparticles Using Surface Enhanced Raman Spectroscopy"

Jenifer Hatch, Sarah Unser, Laura Sagle

University of Cincinnati WISE REU 2013 oral presentation

"Formation of a Liquid-Phase Label Free Biosensor from Nanoparticles and Collagen"

Carlos Matti, Debrina Jana, Jie He, Skyler Smith and Laura Sagle

University of Cincinnati Department of Chemistry NSF-REU poster presentation, summer 2013

"Removal Of Capping Agents For Improved Biosensing"

James Barnett, Sarah Unser, Laura Sagle

University of Cincinnati Undergraduate Research Symposium, poster presentation, Spring, 2013

"Applying Chemical Methods to the Development of Better Biosensing Technology"

William Lum, Haohan Zhao, Laura Sagle

University of Cincinnati Undergraduate Research Symposium, poster presentation, Spring, 2013

"Nano-Scale Patterning On Glass Substrates By Colloidal Lithography"

Ian Campbell, Sarah Unser, Laura Sagle

University of Cincinnati Undergraduate Research Symposium, poster presentation, Spring, 2013

"Bio-Sensing With Plasmonic Coupling Of Protein-Nanoparticle Composites"

Sarah Unser, Ian Campbell, Jenifer Hatch and Laura Sagle

Pittcon National Conference, Chicago, IL, March 2014, poster presentation

"Plasmonic Glucose Sensing With Collagen-Nanoparticle Arrays"

William Lum, Haohan Zhao and Laura Sagle

Pittcon National Conference, Chicago, IL, March 2014, poster presentation

"Sub 20 nm Protein Patterning By Hole-Mask Colloidal Lithography"

Debrina Jana, Carlos Matti, Jie He and Laura Sagle

Pittcon National Conference, Chicago, IL, March 2014, poster presentation

"Biosensing With Capping Agent-Free Gold Nanostars"

Carlos Matti, Debrina Jana, Jie He and Laura Sagle

ACS National Conference, Dallas, TX, March 2014, poster presentation

"Biosensing With Capping Agent-Free Gold Nanostars"

Ian Campbell, Sarah Unser, and Laura Sagle

National Conference For Undergraduate Research, Lexington, KY, April 2014, poster presentation

"Direct Detection Of Physiological Glucose Through Gold Nanoparticle Formation"

Sarah Unser, Ian Campbell, Debrina Jana and Laura Sagle

ACS National Conference, San Francisco, CA, August 2014, oral presentation

"Direct Glucose Sensing in the Physiological Range Through Plasmonic Nanoparticle Formation"

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Sarah Unser, Ian Campbell, Debrina Jana and Laura Sagle

ACS Central Regional Meeting, Pittsburgh, PA, October, 2014, oral presentation

“Direct Glucose Sensing in the Physiological Range Through Plasmonic Nanoparticle Formation”

William Lum, Mario Vieweger, Haohan Zhao, Peixin Guo and Laura Sagle

ACS Central Regional Meeting, Pittsburgh, PA, October, 2014, oral presentation

“Single Protein Patterning Using Hole-Mask Colloidal Lithography”

PAST PRESENTATIONS

American Chemical Society Conference, March, 2009

“Infrared-Visible Sum Frequency Generation Spectroscopy as a Tool for Probing Small Molecule Denaturants and Stabilizers at the Protein-Water Interface”, **invited** oral presentation

Texas Protein Folders Meeting, March, 2008

“Urea Denaturation Revisited: Support for the Indirect Mechanism of Denaturation”, **invited** oral presentation

Negotiating the Ideal Faculty Position Workshop for Women in Science and Engineering, October, 2008

“Insights Into the Molecular-Level Mechanism of Small Molecule Denaturants and Stabilizers on Protein-Mimetic Systems”, oral presentation

American Chemical Society Conference, April, 2008

“Hydrogen-Bonding Interactions of Urea and Substituted Urea Compounds with PNIPAM: Support for the Indirect Mechanism of Denaturation”, oral presentation

Rice University, Department of Physics and Astronomy Colloquia, Spring, 2005

“Carbon-Deuterium Bonds as an Infrared Probe of Protein Dynamics, Local Dielectric and Folding”, **invited** oral presentation