

# Paul Johns

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## EDUCATION

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UNIVERSITY OF NOTRE DAME Notre Dame, IN  
**Philosophiae Doctor**, Physical Chemistry May 2017  
Dissertation: *Surface Plasmon Polaritons in Gold Nanostructures: Conversion, Coupling, and Confinement*  
Advisor: Gregory V. Hartland

SAINT FRANCIS UNIVERSITY Loretto, PA  
**Bachelor of Science** in Chemistry, minors in Mathematics and Physics May 2007  
Graduated *Magna Cum Laude*, Honors Program Graduate  
Thesis: *Quantum Mechanical/Molecular Mechanical Simulations of the Fluorescence Quenching of H-Type Homodimers of Fluorescein and Tetramethyl Rhodamine*  
Advisor: Pedro L. Muino

## PROFESSIONAL EXPERIENCE

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**University of Notre Dame** Notre Dame, IN  
**Postdoctoral Researcher** May 2017–present

Continued finite element calculations to model electromagnetic phenomena including surface plasmon polaritons and electromagnetic coupling

**University of Notre Dame** Notre Dame, IN  
**Doctoral Researcher, Physical Chemistry** September 2007–May 2008; January 2013–May 2017

Developed procedures to model surface plasmon propagation in nanostructures in two-dimensional and three-dimensional models using the finite element program COMSOL Multiphysics

Utilized a pump/probe technique with a galvo scanning mirror to directly image plasmon propagation in nanostructures

Wrote programs in LabVIEW, Igor Pro, MATLAB, Python, and Java to automate data acquisition and processing

**Saint Francis University** Loretto, PA  
**Undergraduate Researcher, Chemistry** September 2004–May 2007

Continued investigating the quenching mechanisms of dimers of fluorescent dyes resulting in a conference presentation and Honors Thesis topic

**Montana State University** Bozeman, MT  
**Research Experience for Undergraduates, Chemistry** Summer 2006

Investigated the quenching mechanisms of dimers of fluorescent dyes using molecular dynamics software

**ChemImage, Corp.** Johnstown, PA  
**Applications Scientist Intern** May 2004–July 2005

Validated CI Print Macroscopic Chemical Imaging System™ for detection of latent and patent fingerprints

Assisted in developing a Raman chemical database for identification purposes which was incorporated into the Falcon Molecular Chemical Imaging System™ database

## PUBLICATIONS

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- Hartland, G.V.; Besteiro, L.; Johns, P.; Govorov, A.O. "What's so Hot about Electrons in Metal Nanoparticles?" *ACS Energy Lett.*, **2017**, *2*, 1641–1653.
- Zeng, Z.-C.; Wang, H.; Johns, P.; Hartland, G.V.; Schultz, Z.D. "Photothermal Microscopy of Coupled Nanostructures and the Impact of Nanoscale Heating in Surface-Enhanced Raman Spectroscopy." *J. Phys. Chem. C*, **2017**, *121*, 11623–11631.
- Johns, P.; Beane, G.A.; Yu, K.; Hartland, G.V. "Dynamics of Surface Plasmon Polaritons in Metal Nanowires." *J. Phys. Chem. C*, **2017**, *121*, 5445–5459.
- Johns, P.; Yu, K.; Devadas, M.S.; Hartland, G.V. "Role of Resonances in the Transmission of Surface Plasmon Polaritons between Nanostructures." *ACS Nano*, **2016**, *10*, 3375–3381.
- Devadas, M.S.; Devkota, M.; Johns, P.; Li, Z.; Lo, S.S.; Yu, K.; Huang, L.; Hartland, G.V. "Imaging Nano-Objects by Linear and Nonlinear Optical Absorption Microscopies." *Nanotechnology*, **2015**, *26*, 354001.
- Johns, P.; Devadas, M.S.; Hartland, G.V. "Transient absorption microscopy studies of single metal and semiconductor nanostructures." *Proc. SPIE*, **2015**, *9549*, Physical Chemistry of Interfaces and Nanomaterials XIV, 954914.
- Johns, P.\*; Yu, K.\*; Devadas, M.S.; Li, Z.; Major, T.A.; Hartland, G.V. "Effect of substrate discontinuities on the propagating surface plasmon polariton modes in gold nanobars." *Nanoscale*, **2014**, *6*, 14289–14296. \*These authors contributed equally to this work
- Devadas, M.; Li, Z.; Major, T.; Lo, S.; Havard, N.; Yu, K.; Johns, P.; Hartland, G. "Detection of Single Gold Nanoparticles Using Spatial Modulation Spectroscopy Implemented with a Galvo-Scanning Mirror System." *Applied Optics*, **2013**, *52*, 7806–7811.

## PRESENTATIONS

(\*indicates presenting author)

- Johns, P.\*; Yu, K.; Devadas, M.S.; Li, Z.; Major, T.A.; Hartland, G.V. "Effects of Localized Dielectric Substrate Discontinuities on Surface Plasmon Polariton Modes in Gold Nanobars." IEEE Annual Mini-symposium on Electron Devices and Photonics, University of Notre Dame, 2014.
- Major, T.A.; Lo, S.S.; Devadas, M.S.; Li, Z.; Johns, P.\*; Yu, K. "Plasmonic Materials for Energy Applications: The Hartland Group" Energy Week, University of Notre Dame, 2014.
- Johns, P.\*; Callis, P.; Muñio, P. "Quantum Mechanical/Molecular Mechanical Simulations of the Fluorescence Quenching of H-Type Homodimers of Fluorescein and Tetramethyl Rhodamine." Presented at the 51<sup>st</sup> Biophysical Society Annual Meeting, Baltimore, MD, 2007.
- Schuler, R.\*; Exline, D.; Powers, T.; Johns, P.; Treado, P. "Validation of the CI Print Macroscopic Chemical Imaging System for the Analysis of Latent Fingerprints." Presented at the American Academy of Forensic Sciences 57th Annual National Meeting, New Orleans, LA, 2004.

## TECHNICAL SKILLS

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Pump/probe spectroscopy, transient absorption spectroscopy, class 100 cleanroom training, Airco FC-1800 electron-beam evaporator for metal deposition, lasers, oscilloscopes, photodetectors, instrument maintenance, general optics, plasmonics, finite element modeling, COMSOL Multiphysics, LabVIEW, MATLAB, Mathematica, Igor Pro, OriginPro, Python, Java, Microsoft Office, L<sup>A</sup>T<sub>E</sub>X, data processing, data analysis

## TEACHING EXPERIENCE

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UNIVERSITY OF NOTRE DAME

Notre Dame, IN

### Instructor, Physical Chemistry II, Spring 2014

Lesson composition and instruction, homework composition, and exam composition focusing on statistical mechanics, thermodynamics and kinetics, 3 students, chemistry majors who were returning from a semester abroad

**Teaching Assistant, Introduction to Chemical Principles Tutorial**, Fall 2013

Discussion sessions based on homework problems, 3 sections, approximately 30 students each, non-chemistry science majors

**Teaching Assistant, Chemistry Across the Periodic Table**, Spring 2013

Laboratory, emphasis on inorganic synthesis, 2 sections, approximately 20 students each, non-chemistry science majors

**Teaching Assistant, Chemistry Across the Periodic Table**, Spring 2008

Laboratory, emphasis on inorganic synthesis, nanoscience, and kinetics, 1 section, approximately 20 students, chemistry majors

**Teaching Assistant, Analytical Chemistry**, Fall 2007

Laboratory, emphasis on use of instrumentation and analytical techniques, 3 sections, approximately 30 students each, chemistry majors

**Curriculum Developer, Analytical Chemistry**, Summer 2007

Assisted in redesigning the laboratory activities for the analytical lab

SAINT FRANCIS UNIVERSITY

Loretto, PA

**Instructor, Organic Chemistry II**, Spring 2012

Laboratory, emphasis on synthetic chemistry, 2 sections, 10 and 12 students, chemistry majors and other science majors

**Instructor, Chemical Principles II**, Spring 2012

Laboratory, emphasis on basic lab technique, maintaining lab records, and exposure to a variety of chemical methods, 1 section, 15 students, chemistry majors and other science majors

**Instructor, Organic Chemistry I**, Fall 2011

Laboratory, emphasis on basic lab techniques in synthesis and characterization, 1 section, 13 students, chemistry majors and other science majors

**Instructor, Physical Chemistry I**, Fall 2011

Laboratory, emphasis on thermodynamics and kinetics, 2 sections, 9 engineering majors, 10 chemistry majors

**Substitute Lecturer**, Fall 2009–Spring 2010

Lecture, substitute for Instrumental Analysis, Human Chemistry I, and Human Chemistry II (chemistry for health science majors)

**Undergraduate Teaching Assistant, Human Chemistry I & II**, Fall 2004–Spring 2007

Laboratory, emphasis on basic lab technique, synthesis, and analysis, 6 semesters, 2 sections of 15 per semester

**Physics Review Session Leader**, Fall 2005–Spring 2007

Tutorial section, general two semester physics course for science majors, assisted students with homework problems, explained concepts, proctored exams

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**WORKSHOPS AND CONFERENCES ATTENDED**

TEACHING

**Reading Group: *Teaching and Learning STEM: A Practical Guide* by Richard Felder and Rebecca Brent**,

University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2017

**Concept Mapping with VUE**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Improving Teaching and Learning One Step at a Time**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Fundamentals of Course Design IV: Lesson Planning**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Fundamentals of Course Design III: Assessment and Exam Design**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Fundamentals of Course Design II: Writing a Syllabus**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Fundamentals of Course Design I: Developing Learning Goals**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Presentation Zen**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2015

**Mentoring Undergraduate Research in STEM Disciplines**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Effective Lecture Strategies**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Teaching and Evaluating Oral Communication**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Reading Group: *What the Best College Teachers Do* by Ken Bain**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Developing Your Classroom Presence**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Gathering Early Semester Student Feedback**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Motivating Students: The Surprising Truth about What Works**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2014

**Developing a Teaching Statement**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2013

**Helping Students in Distress: Tips for Faculty and TAs**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2013

**TA Orientation: Succeeding as a TA in Lab and Tutorial Settings**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2013

**TA Orientation: Navigating Difficult Classroom Situations**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN

**TA Orientation: Approaching the 1st Day of Class and Setting the Tone for the Semester**, University of Notre Dame, Kaneb Center for Teaching and Learning, Notre Dame, IN, 2013

**Biennial Conference on Chemical Education**, Pennsylvania State University, State College, PA, 2012

#### RESEARCH CONFERENCES

**IEEE Annual Mini-symposium on Electron Devices and Photonics**, University of Notre Dame, 2015

**IEEE Annual Mini-symposium on Electron Devices and Photonics**, University of Notre Dame, 2014

**The 51<sup>st</sup> Biophysical Society Annual Meeting**, Baltimore, MD, 2007

**Pittcon Conference & Expo**, Orlando, FL, 2005

#### SELECTED AWARDS AND HONORS

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**Graduate Assistance in Areas of National Need (GAANN) Teaching Fellow**, University of Notre Dame, 2014–present

**Advanced Teaching Scholar**, Kaneb Center for Teaching and Learning, University of Notre Dame, 2015

**Statement of Accomplishment with Distinction: An Introduction to Evidence-Based Undergraduate STEM Teaching, MOOC**. Offered by Vanderbilt University through Coursera, 2014

**Striving for Excellence in College and University Teaching**, Kaneb Center for Teaching and Learning, University of Notre Dame, 2014

**Outstanding Graduate Student Teacher Award for Excellence in Teaching**, Kaneb Center for Teaching and Learning, University of Notre Dame, 2008

**Barry M. Goldwater Scholar**, Barry M. Goldwater Scholarship and Excellence in Education Program, 2006

#### **PROFESSIONAL ORGANIZATIONS**

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<b>American Chemical Society</b> , Graduate Student Member	2005–present
<b>SPIE—The International Society for Optical Engineering</b> , Graduate Student Member	2015–2016
<b>American Association for the Advancement of Science</b> , Graduate Student Member	2007–present
<b>Biophysical Society</b> , Student Member	2007

#### **LEADERSHIP AND SERVICE**

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**Science Fair Judge**, Northern Indiana Regional Science & Engineering Fair, Elementary Physical Sciences Committee/Junior Physical Science Committee, 2013–2014, 2016, 2017

**Science Day Presenter**, 11<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> Annual Science Day, Saint Francis University, 2004, 2011–2012

**Peer Reviewer**, *Spectrum*, the self-published journal of Saint Francis University, 2010–2011

**Organizer Physical Science Lessons**, Penn Mont Montessori School, Hollidaysburg, PA, students from Physical Chemistry I created and led the lessons and experiments, 2011.

**Trigonometry Tutor**, Archbishop Carroll High School, Washington, DC, 2010–2011

**Event Leader**, Rural Outreach Chemistry for Kids, Saint Francis University, led and demonstrated science experiments with area elementary, middle, and high school students, 2003–2009

**Science Fair Judge**, Pennsylvania Junior Academy of Science, 2005