

Purdue University (1999-2003)

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***Intrinsic and Compound
Semiconductor Surface Chemistry: Intelligent Interfacial Design Facilitated through Novel
Functionalization and Deposition Strategies***

University of Houston (1995-1999)

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Metal Nanoparticles Functionalized by the Adsorption of Thiols and Disulfides

***Professor of Chemistry; Director, Wabash College 3D Printing & Fabrication Center (3D-PFC); &
Undergraduate Research Committee Chair***

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Graduate Research

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Undergraduate Research

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- *Chair*
- *Director*
- *Chair*
- *Department Chair*
- *Co-Chair*

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Advanced Inorganic Chemistry

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Structure & Reactivity

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Quantitative Chemistry

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Descriptive Chemistry

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Important Books (Sr. Coll.)

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Materials Chemistry

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Cultures & Traditions

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General Chemistry

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Survey of Chemistry

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Scanning Electron Microscopy

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Electron Microscopy

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Forensic Chemistry

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Life Lessons from the Undead

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Survival Horror & Sci-Fi

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Nanoscience and Nanohype

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Chemical Nanotechnology

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Advanced Inorganic Chemistry

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Synthetic Organic Chemistry

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Problem Solving in General Chemistry

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Problem Solving in General Chemistry

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Wabash College McLain-McTurnan-Arnold Excellence in Teaching Award – 2016

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National Science Foundation Graduate Research Fellowship – 1999 - 2002

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First Place

First Place

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- **3D Printable Resources for Engaging STEM Students in Laboratory Learning Activities and Outreach Programs: Inexpensive and User-Friendly Instrument Kits for Educators** MRS Adv.
- **High-Impact Practices in Materials Science Education: Student Research Internships Leading to Pedagogical Innovation in STEM Laboratory Learning Activities** MRS Adv.
- **Simple and Inexpensive 3D Printed Filter Fluorometer Designs: User-Friendly Instrument Models for Laboratory Learning and Outreach Activities** J. Chem. Educ.
- **User Friendly 3D Printed Colorimeter Models for Student Exploration of Instrument Design and Performance** J. Chem. Educ.
- **Alkyl-Functionalization of Porous Silicon via Multimode Microwave-Assisted Hydrosilylation**
Polyhedron
- **Active Learning and Student Engagement via 3D Printing and Design: Integrating Undergraduate Research, Service Learning, and Cross-Disciplinary Collaborations** MRS Adv.
- **Low Frequency Analysis of Carbon Fiber-Reinforced Polymer (CFRP)-Laminate Bond on Reinforced Concrete (RC) Bridges** Proceedings of the 7th International Conference on Advanced Composite Materials in Bridges and Structures
- **Formal NSF Styled Proposal Writing in Preparation for Original Multi-Week Laboratory Projects**
- **Functionalized Porous Silicon in a Simulated Gastrointestinal Tract: Modeling the Biocompatibility of a Monolayer Protected Nanostructured Material**
Materials Research Society (MRS)
Symposium Proceedings
- **Introductory Nanoscience and Nanotechnology for Undergraduates: A Liberal Arts Approach**

-Invited
- **Chemical Nanotechnology: A Liberal Arts Approach toward a Basic Course in Emerging Interdisciplinary Science and Technology** J. Chem. Educ.
- **Nanotechnology and the Future of Bioanalytical Methods**

-Invited
- **Synthesis and Patterning of Gold Nanostructures on InP and GaAs via Galvanic Displacement** Small
- **It was the Best of Times, it was the Worst of Times: Confessions of a Graduate School Survivor**
In Chemistry -Invited

- ***Harnessing Synthetic Versatility Toward Intelligent Interfacial Design: Organic Functionalization of Nanostructured Silicon Surfaces***
Invited
- ***Metallic Nanostructures via Static Plowing Lithography***
Nano Letters
- ***New Pairs of Inks and Papers for Photolithography, Microcontact Printing, and Scanning Probe Nanolithography***
Materials Research Society (MRS) Symposium Proceedings
- ***Functionalization of Porous Silicon with Alkenes and Alkynes via Carbocation-Mediated Hydrosilylation***
Materials Research Society (MRS) Symposium Proceedings
- ***Electroless Deposition and Patterning of Morphologically Complex Precious Metal Films on Semiconductor Surfaces***
Materials Research Society (MRS) Symposium Proceedings
- ***Electroless Nanoparticle Film Deposition Compatible with Photolithography, Microcontact Printing, and Dip-Pen Nanolithography Patterning Technologies***
Nano Letters
 - See: **NBC News**, Feb. 2003, "Bio Detector"
 - See: **Materials Today**, Feb. 2003, "Nanoparticles by Accident"
 - See: **MICRO Magazine**, Jan. 2003, "Worth Their Weight"
 - See: **Science News**, Dec. 21, 2002, "Gold Deposits: Scientists Design Nanoparticle Films"
- ***Controlled Electroless Deposition of Noble Metal Nanoparticle Films on Germanium Surfaces***
Nano Letters
- ***Hydride Abstraction Initiated Hydrosilylation of Terminal Alkenes and Alkynes on Porous Silicon***
Langmuir
- ***Gold and Silver Nanoparticles Functionalized by the Adsorption of Dialkyl Disulfides***
Langmuir
- ***Metal Nanoparticles Functionalized by the Adsorption of Thiols and Disulfides***
Senior Honors Thesis
- ***As Big as Texas: The American Chemical Society Affiliates in Dallas***
Invited *In Chemistry*
- ***3D Printable Resources for Engaging Students in the Exploration of Instrument Design and Performance: Inexpensive and User-Friendly Instrument Kits for STEM Educators,***
- ***3D Printable Resources for Engaging STEM Students in Laboratory Learning Activities and Outreach Programs—Inexpensive and User-Friendly Instrument Kits for Educators,***
- ***User-Friendly Digital Instrument Plans for STEM Educators: 3D Printable Resources for Student Exploration of Instrument Design and Performance,***

Invited

- *High-Impact Digital Design and 3D Printing Student Research Internships Leading to Pedagogical Innovation in Cross-Disciplinary STEM Education,*
- *3D Printable Resources for Chemical Educators: Supporting Laboratory Learning Activities via User-Friendly Devices*
- *Gaining STEAM: Employing a Campus 3D Printing and Fabrication Center to Bridge Digital Design and Materials Science Education in the Liberal Arts,*
- *High-Impact Practices in Materials Science Education: Student Research Internships Leading to Pedagogical Innovation in STEM Laboratory Learning Activities,*
- *Preserving and Sharing World History via Photogrammetry and 3D Printing: An Interdisciplinary Effort Bridging Archaeology and Materials Science,*
- *Instrument Design Challenges for Engaging Active Learners in the Analytical Chemistry Lab: Introducing CAD and 3D Printing into the Analytical Curriculum,*
- *User-Friendly Digital Models for Chemical Educators: 3D Printable Resources for Student Exploration of Instrument Design and Performance,*
- *Gaining STEAM: Establishing a Campus 3D Printing and Fabrication Center to Explore Cross-Disciplinary Collaboration and Innovation in STEM and the Liberal Arts,*
- *Active Learning and Student Engagement via 3D Printing and Design: Integrating Undergraduate Research, Service Learning, and Cross-Disciplinary Collaborations,*
- *3D Printing at Wabash: Initial Efforts and New Directions in Teaching, Research, and Outreach,*
- *YouTube Chemistry: Online Problem Solving Walkthroughs as Supplemental Learning Tools,*
- *Engaging Freshman Seminar Students with Classroom Gaming Activities: Read, Write, and Play On!,*
- *Putting YouTube to Work for the Liberal Arts: Online Problem Solving Walkthroughs as Student Learning Tools,*
- *Science without Borders: Piloting a New Module for the Summer Ecuador Program,*
- *Alkyl-functionalization of Porous Silicon via Multimode Microwave-Assisted Hydrosilylation: Results of an Undergraduate Research Program Exploring Inorganic Materials Chemistry*
- *Connecting Kids, Chemistry, and the Community: An Innovative Outreach Collaboration with College Mentors with Kids*

- *Some Nano Giants: Wabash Student Research in Silicon Surface Chemistry*
- *Organic Functionalization of Porous Silicon via Hydrosilylation Pathways: Probing Monolayer Stability through Degradation Studies*
Invited
- *Using Nanoscience in a Supporting Role: Introducing Nanoscience into an Upper-Level Undergraduate Materials Chemistry course*
- *Using Popular Media References to Nanoscience in the Chemistry Classroom: Read, Watch, and Play On!*
Invited
- *Organic Functionalization of Porous Silicon via Hydrosilylation Pathways: Probing Monolayer Stability through Degradation Studies*
Invited
- *Engaging and Challenging Undergraduates via Interdisciplinary Coursework: A New Learner-Centered Approach to Materials Chemistry*
- *Comparing Hydrosilylation Routes to Functionalized Porous Silicon*
- *Fostering Student Engagement via Interdisciplinary Themes: A Liberal Arts Approach to Chemistry for Non-Majors*
 - See: **CHEMICAL & ENGINEERING NEWS**, Sept. 2007, Vol. 85, No. 38, pp. 38-40, " Chemistry Isn't Just For Majors"
- *Engaging Non-Majors Beyond Introductory Chemistry: A Liberal Arts Science Course in Forensic Chemistry*
- *Functionalized Porous Silicon in a Simulated Gastrointestinal Tract: Modeling the Biocompatibility of a Monolayer Protected Nanostructured Material.*
- *Discerning Science from Hype: A Liberal Arts Science Course in Forensic Chemistry.*
- *All Monolayers are Not Created Equal: Functionlized Porous Silicon Stability Studies*
- *Tabula Rasa: Tablet PCs in the Classroom and Beyond*
- *An "Investigator-centered" Approach to a Capstone Laboratory Experience: Undergraduate Proposal Writing and Collaborative Research (CHE 441L)*
Invited
- *Forensic Chemistry and the Educated Citizen: A Liberal Arts Approach*
- *Exploring Nanoscience and Nanohype: A Liberal Arts Approach to Emerging Interdisciplinary Science and Technology,*

- *Discerning Science from Hype: A Liberal Arts Science Course in Forensic Chemistry*
- *Degradation of Alkyl Functionalized Porous Silicon in Simulated Acellular Plasma (blood)*
- *Nanoscience-fiction Resources for the Chemistry Classroom: Read, Watch, and Play On!*
- *Functionalized Porous Silicon: Tunable Platforms for Bioanalytical Sensor Design* *Invited*
- *Read, Watch, and Play on! Nanoscience Fiction Resources for the Chemistry Classroom* *Invited*
- *Applications of Symmetry and Group Theory in Bonding and Vibrational Spectroscopy* *Invited*
- *From the PC to the ER: Wabash Student Research toward Silicon BioChip Technology* *Invited*
- *Utilizing Learning Centered Approaches toward an Interdisciplinary Course in Chemical Nanotechnology*
- *Degradation of Alkyl Functionalized Porous Silicon in Simulated Acellular Plasma (blood)*
- *Utilizing Learning Centered Approaches toward an Interdisciplinary Course in Chemical Nanotechnology*
- *Undergraduate Proposal Writing and Collaborative Investigation: A Learning Centered Approach to a Capstone Laboratory Experience*
- *Discerning Science from Hype: A New Course in Chemical Nanotechnology*
- *Chemical Nanotechnology: A Balanced Course Approach toward Emerging Science and Technology*
- *Chemical Nanotechnology: A Liberal Arts Approach toward a Basic Course in Emerging Science and Technology*

- *Nanopatterning Noble Metals onto Semiconductor Substrates via Scanning Probe Nanolithography* _____

Invited
- *Noble Metal Nanostructures on Semiconductor Substrates: Fabrication via Scanning Probe Nanolithography* _____

Invited
- *Electroless Deposition of Noble Metal Nanoparticle Films: Facile Routes to Patterned Surfaces via Photolithography, Microcontact Printing, and Scanning Probe Nanolithography* _____

Invited
- *Preparation and Characterization of Noble Metal Nanoparticle Films on Semiconductor Substrates* _____

Poster Award (COLL Division)
- *Facile Electroless Deposition Routes to Noble Metal Nanoparticle Films: New High-Surface-Area Substrates for Fundamental and Applied Investigations* _____
- *Facile Electroless Deposition Routes to Noble Metal Nanoparticle Films: New High-Surface-Area Substrates for Fundamental and Applied Investigations* _____
- *Electroless Deposition and Patterning of Morphologically Complex Precious Metal Films on Semiconductor Surfaces* _____
- *Nanoscale Patterning of Organic and Inorganic Structures on Silicon Surfaces* _____
- *New Pairs of Inks and Papers for Photolithography, Microcontact Printing, and Scanning Probe Nanolithography* _____
- *Patterned Electroless Deposition of Precious Metal Nanoparticles on Semiconductor Surfaces* _____
- *Organic Monolayers on Silicon and Germanium Surfaces: Harnessing Synthetic Versatility Toward Intelligent Interfacial Design* _____

Invited
- *Noble Metal Nanoparticle Films Compatible with Photolithography, Microcontact Printing, and Dip-Pen Nanolithography Patterning Technologies* _____
- *Electroless Deposition of Morphologically Complex Noble Metal Films on Semiconductor Surfaces* _____

- *Patterned Electroless Deposition of Precious Metal Nanoparticles on Metal and Semiconductor Surfaces* _____
- *Photopatterned Electroless Deposition of Precious Metal Nanoparticles on Semiconductor Surfaces* _____
- *Chemical Weapons of Mass Destruction: History, Synthesis, Toxicology, and Detection of Organophosphorous Nerve Agents* _____
- *Bioelectronic Sensor Arrays as Viable Sensing Alternatives for Analytes of Domestic and Defense Interest*
_____ *Invited*
- *From the Backyard to the Battlefield: Arthropod-Based Neural BioFET Arrays as Viable Sensing Alternatives for Analytes of Domestic and Defense Interest* _____
- *Hydride Abstraction Initiated Hydrosilylation of Terminal Alkenes and Alkynes on Porous Silicon*

- *Hydride Abstraction Initiated Hydrosilylation of Terminal Alkenes and Alkynes on Porous Silicon*

- *Computer-Aided Design (CAD), Fabrication, and Testing of an Inexpensive 3D Printed Filter Fluorometer,* _____
- *Prototyping a Simple and Inexpensive Colorimeter from 2D Designs via Laser Cutting and Engraving,* _____
- *Design and Fabrication of a 3D Printed Fluorometer: A Low-Cost Tool for Student Exploration of Instrument Design and Performance,* _____
- *From CAD to Reality: A Simple and Inexpensive 3D Printed Colorimeter for Laboratory and Outreach Activities,* _____
- *Functionalization of Photoluminescent N-Type Porous Silicon with Aldehydes via Hydrosilylation Reactions: Oxidation and Degradation Monitored via Transmission Mode Fourier Transform Infrared (FTIR) Spectroscopy,* _____
- *Exploring the Stability of Organic Monolayers Covalently bound to Hydride-Terminated Porous Silicon Surfaces: Degradation Studies Monitored via Transmission Mode FTIR,* _____
- *Bonding Organic Molecules to Silicon Surfaces: Hydrosilylation of Aldehydes onto Hydride-Terminated Porous Silicon,*

- *Microwave Functionalization of Hydride-Terminated Porous Silicon: Initial Steps toward New Solid-Supported Catalysts,* _____
- *Oxidation of Porous Silicon in Organic Solvents: FTIR and SEM Analysis,* _____
- *Oxidative Degradation of Alkyl-Functionalized Porous Silicon in Simulated Acellular Blood Plasma Monitored via FTIR and SEM,* _____
- *Comparing Hydrosilylation Routes to Functionalized Porous Silicon: Oxidation of Functionalized Porous Silicon in Organic Solvents* _____
- *Organic Functionalization of Porous Silicon via Multimode Microwave Reactor-Assisted Hydrosilylation* _____
- *Functionalized Porous Silicon Oxidation in Simulated Gastric and Intestinal Fluids* _____
- *Degradation Studies of Alkyl-Functionalized Porous Silicon in Organic Solvents* _____
- *Controlling Surface Functional Groups on Monolayer Protected Porous Silicon* _____
- *Stability of Functionalized Porous Silicon in a Simulated Gastrointestinal Track* _____
- *Probing Monolayer Stability via Deterioration of Functionalized Porous Silicon in Alkaline Environments* _____
- *Probing Monolayer Stability through Chemical Reactions on Functionalized Porous Silicon* _____
- *Degradation of Long-chain Alkyl Functionalized Porous Silicon in Simulated Acellular Plasma* _____
- *Degradation of Short-chain Alkyl Functionalized Porous Silicon in Simulated Acellular Plasma* _____
- *Degradation of Functionalized Porous Silicon in Simulated Gastric Fluid* _____
- *Degradation of Functionalized Porous Silicon in Simulated Body Fluids* _____
- *Organic Synthesis on a Chip: Chemical Reactions on Functionalized Porous Silicon* _____
- *Carbocation Mediated Hydrosilylation of Porous Silicon: A Route toward Organic Synthesis on a Chip* _____