



SUNAYANA MITRA

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EDUCATION

University of Pittsburgh

Doctor of Philosophy, Chemistry. Physical Chemistry division.

Aug 2014 - Aug 2021

Pittsburgh, PA

Indian Institute of Science Bangalore

Internship Projects in the Department of Physical Chemistry.

Dec 2012 - Jan 2014

Bangalore, India

University of Rochester

Rotation Projects in the Department of Biophysics & Biochemistry (BSCB Cluster).

Aug 2011 - Sep 2012

Rochester, NY

University of Calcutta

Masters in Biochemistry, Bachelors in Biochemistry

Jul 2008 - Jul 2010

Kolkata, India

PUBLICATION LIST

- **Sunayana Mitra**, Keith Werling, Eric Berquist, Daniel Lambrecht, and Sean Garrett-Roe; CH Mode Mixing Determines the Bandshape of Carboxylate Symmetric Stretch in Apo, Ca^{2+} , and Mg^{2+} - EDTA; *J. Phys. Chem. A. In Press, 2021.*
- **Sunayana Mitra** and Eugene Wagner; Introducing undergraduates to primary research literature; *J.Chem. Ed. In Press, 2021.*
- Zhe Ren, Jordan Kelly, C. Prasad Gunathilaka, Thomas Brinzer, Samrat Dutta, Clinton A. Johnson, **Sunayana Mitra** and Sean Garrett-Roe; Ultrafast dynamics of ionic liquids in colloidal dispersion; *Phys. Chem. Chem. Phys.*, 2017,19, 32526-32535.

ACADEMIC EMPLOYMENT

Research in Ultrafast Vibrational Spectroscopy

Aug 2014 - Aug 2021

Graduate Researcher & Collaborator

Pittsburgh, PA

- Dissertation Advisors: Prof. Sean Garrett-Roe, Prof. Sunil Saxena, Prof. Jennifer Laaser, Prof. Daniel Lambrecht.
- Thesis Topic: *Characterizing metal-small molecule structure and proton transfer in protic ionic liquids using ultrafast spectroscopy.*
- Examined carboxylate-divalent metal binding geometry in solution using ultrafast two dimensional infrared spectroscopy.
- Investigated the proton transfer mechanism in protic ionic liquids with time resolved multi-probe spectroscopy, singular value decomposition and kinetic modeling.
- Presented research at 3 local conferences and 2 national conferences.
- Built Galilean telescope optical setup in a home-built OPA; Proficient in optics alignment; Proficient in computational chemistry, MATLAB & Python data analysis; Experienced in scientific methods, scientific communication and writing skills.
- Conducted a total of 5 weeks of experiments at Central Laser Facility, Rutherford Appleton Laboratory UK and analysed ultrafast spectroscopy data.

Research on Undergraduate Teaching Methods

Nov 2017 - Present

Researcher & Teacher

Pittsburgh, PA

- Introduced undergraduates to primary research literature.
- Conducted 5 workshops to train undergraduates in comprehending and extrapolating ideas from scientific papers.
- Presented finding at 5 national conferences.
- Actively engaged in teaching freshmen undergraduates to distinguish between secondary and primary literature and how to read scientific primary literature.
- Received CIRTL certification and dB-SERC 'Mentor-Mentee' award for conducting teaching as research project.

Teaching Experience

Aug 2014 - Apr 2019

Teaching Fellow

Pittsburgh, PA

- Honors General Chemistry Course 720 (Primary TF)
- Physical Chemistry Course 1430 (TF-Teaching Fellow)
- General Chemistry Course 120 (TA)
- General Chemistry Course 970 (TA)
- General Chemistry Course 110. (TA-Teaching Assistant)
- Instructed over 15 Lab sections, conducted recitation, delivered tutorials, designed quizzes, conducted feedback workshops and teaching as research materials, graded lab reports, graded exams and held student office hours.
- Mentored : Junior researchers in my research laboratory; Undergraduate Teaching assistants in Chem 0720 courses; Pitt Teaching Center workshops participants. *Center for the Integration of Research, Teaching and Learning (CIRTL) Learning Community*, provided feedback and mentored participants in Teaching As Research projects.

COLLABORATIONS

Computational Chemistry | *DFT, QChem, Gaussian* **2015 - Present**

- Collaborators: Dr. Keith Werling, Dr. Eric Berquist, Prof. Daniel Lambrecht.
- Demonstrated learning 2 quantum computational chemistry software and communicated the carboxylate research project.
- Led computational collaboration meetings.
- Used *Density Functional Theory* for thesis research.

Research on Undergraduate Teaching Methods | *Teaching Award, Teaching Grant* **Nov 2017 - Present**

- Collaborator: Prof. Eugene Wagner.
- Won a mentor-mentee grant to implement the teaching-as-research project.
- Conducted the scaffolded project for two years, spanning two semesters each for one round of implementation.
- Designed the project, worksheets, surveys, and workshops for each implementation, and presented oral talks at 5 national conferences.

Rutherford Appleton Laboratories | *2D-IR, TRMPS, TRIR* **Feb 2017 - Present**

- Central Laser Facility (CLF) ULTRA facility. Research is partially supported by the Science and Technology Facilities Council (STFC); Harwell Campus, Didcot, UK.
- 2019 : *Revisiting the 2D-IR measurement of the activation energy of a hydrogen bond.*
- Collaborators: Prof. Paul Donaldson, Prof Sean Garrett-Roe, Prof. Steve Corcelli.
- 2017: *Interplay Between Ultrafast Vibrational Spectroscopy & Nuclear Quantum Effects on the Proton Transfer Mechanism/Dynamics of Protic Ionic Liquids.*
- Collaborators: Prof. Paul Donaldson, Prof Sean Garrett-Roe, Prof. Tony Parker and Dr. Maria Izzo.

TEACHING PROFESSIONAL DEVELOPMENT & OUTREACH

Discipline-Based Science Education Research Center (dB-SERC) **May 2018 - Present**

- Won dB-SERC Mentor-Mentee grant to implement *Teaching As Research (TAR)* project on Honors General Chemistry Course Apr 2019.
- Implemented “Developing primary research literature reading comprehension skills in first year students” TAR project in *Honors General Chemistry Curriculum*. Publication In Press in J.Chem. Ed.
- Executed mentor-mentee grant research on Honors General Chemistry course I & II. Created assessments, workshops and opinion surveys for students.

Center for the Integration of Research, Teaching, and Learning **Aug 2017 - Present**

- Active member of Center for the Integration of Research, Teaching, and Learning (CIRTL). Presented CIRTL TAR project at 25th Biennial Conference on Chemical Education (BCCE).
- Completed Pitt-CIRTL Certification in STEM Teaching, University of Pittsburgh, 2019 – Scholar, Practitioner and Associate certification programs, drafted a teaching philosophy statement and a teaching portfolio, attended seminar courses, workshops, and gained scholarly teaching skills.
- Developed and implemented a TAR project in Honors General Chemistry class 2018-2020.
- Mentored CIRTL learning community members and participated in CIRTL professional development program.
- Disseminated TAR project in the CIRTL community and contributed to the existing undergraduate teaching methods.

Center for Teaching and Learning, University of Pittsburgh **Jan 2018 - Present**

- Received *Pedagogy Badge* in Spring 2019. Participated in workshops on Professional Development, Pedagogy and Diversity.
- Facilitated Teaching Assistant Orientation Aug, 2019. Led discussion between first year graduate students about teaching responsibilities and TA'ing at Pitt. Organised by the University of Pittsburgh Teaching center.
- Participated in *Mentoring Matters: How to Cultivate Productive Mentoring Relationships*. Workshop organised by Center for Doctoral and Postdoctoral Career Development, University of Pittsburgh, Sep 11, 2019.

Pitt Phi Lambda Upsilon (PLU) Student Outreach Program **Sep 2019 - Sep 2020**

- Worked with high-school students. Taught school students exciting scientific laboratory skills. This outreach program aims to motivate high school students in science.

CONFERENCES & WORKSHOPS

- “*Insights into EDTA—metal binding geometry from the carboxylate symmetric stretch infrared spectral region*”; Poster abstract submitted to TRVS Conference 2021. Virtual meeting in June 13–18, 2021.
- “*Approach to teaching undergraduates how to evaluate primary literature and synthesize their conclusion critically*”; Oral presentation in ACS Fall Conference 2020, virtual Sci-Meeting in San Francisco, Aug 18, 2020.
- “*Mode mixing between the carboxylate symmetric stretch and CH bends cause the vibrational structures in EDTA, [Ca:EDTA]²⁻, [Mg:EDTA]²⁻ spectrum*”; Poster presentation in ACS Fall Conference 2020, virtual Sci-Meeting in San Francisco, Aug 18, 2020.
- “*A method to develop undergraduate ability to interpret & analyze primary research*”; Oral presentation in Disciplined-Based Science Education Research organization, Pittsburgh, University of Pittsburgh, Jun 8, 2020.
- “*Mode mixing between the carboxylate symmetric stretch and CH bends cause the vibrational structures in EDTA, [Ca:EDTA]²⁻, [Mg:EDTA]²⁻ spectrum*”; Accepted abstract in Gordon Conference 2020, RI. Conference was cancelled due to covid-19 pandemic.
- “*Developing primary literature comprehension skills in Honors General Chemistry students*”; Oral presentation in ACS Conference 2020, virtual Sci-Meeting in Philadelphia, Mar 26, 2020. Oral presentation in Disciplined-Based Science Education Research organization, Pittsburgh, University of Pittsburgh, Feb 13, 2020. Oral presentation at CIRTL, University of Pittsburgh, February 2019.
- “*Applying primary literature to freshmen laboratory*”; Oral presentation at 25th Biennial Conference on Chemical Education, University of Notre Dame, Jul 29 - Aug 2, 2018.
- Actively participated in *POGIL-PCL Workshop*, University of Pittsburgh, May 8-10, 2019.
- “*Kinetics of proton transfer in protic ionic liquids*”; Poster presentation at PQI 2018, Pittsburgh Quantum Institute, Pittsburgh, Apr 18-20, 2018. Poster presentation at Society of Women in Engineering: Women in STEM Conference, Pittsburgh, Feb 10, 2018. Poster presentation at Science 2017, Pittsburgh Quantum Institute, Pittsburgh, Oct 18-20, 2017.

AWARDS, ACHIEVEMENTS & EXTRA CURRICULARS

- Completed the “Pitt-CIRTL Scholar Level Certification (3rd and Final level)” Pittsburgh, Dec, 2019.
- Received the “2019 Safford Awards for Excellence as a Graduate Student Teacher”. Honored by the Department of Chemistry, University of Pittsburgh.
- Received the Mentor Mentee award for “Developing primary research literature reading comprehension skills in first year students” Teaching as Research Project from the Disciplined-Based Science Education Research organization, Pittsburgh, Apr, 2019.
- Completed “Pitt-CIRTL Practitioner Level Certification (2nd level)” Pittsburgh, Apr, 2019.
- Nominated for the “2019 Elizabeth Baranger Excellence in Teaching Award” University of Pittsburgh, Feb, 2019.
- Received “Pedagogy Badge” Center for Teaching and Learning, University of Pittsburgh, Pittsburgh, Feb, 2019.
- Completed the “Pitt-CIRTL Associate Level Certification (1st level)” Pittsburgh, Apr, 2018.
- Earned a fellowship for pursuing PhD in Biophysics at University of Rochester.
- Awarded Sangeet Bivakar title in Vocal Music conducted by Bangiya Sangeet Parisad. (*First Division with Distinction*)
- Received a gold medal in cultural competition (Nazrulgeeti) held on March, 2009, University of Calcutta.

PRE-DOCTORAL INTERNSHIPS

Indian Institute of Science Bangalore

Dec 2012 - Jan 2014

- Junior Research Fellow. Advisor: Prof. Siva Umamathy.
- Examined Triplet-Triplet energy transfer to nucleobases with amino acid sensitizer using ‘nanosecond flash photolysis’.
- Investigated structural signature changes in nucleobases with change in pH using Raman spectroscopy.
- “Flash Photolysis study of TTET from Tyrosine to Nucleobases.” Poster Presentation in DAE-BRNS NLS-22, Manipal University, Manipal, India, Jan 8 - 11, 2014.

University of Rochester, Medical Center**Aug 2011 - Sep 2012**

- Advisor: Prof. Dmitri Ermolenko. *Characterized the unwinding of the Shine Dalgarno - Anti Shine Dalgarno sequence using FRET.*
- Advisor: Prof. Mark Dumont. *Probed the oligomerization of Green Protein Coupled Receptors (GPCR) in yeast by FRET.*
- Advisor: Prof. Alan Smrka. *Interrogated the role of PLC β 3's C terminus in binding the intercellular loop-3 of Human Muscarinic Receptor M3 (M3i3).*
- Advisor: Prof. David McCamant. *Examined the quantum yields of thymine dimers (TpT) at different wavelengths, using Xenon-Arc-Lamp flash photolysis.*
- Advisor: Prof. Danielle Benoit. *Synthesized and characterized a cohort of nanoparticles forming a complex with si-RNA. Delivered hMSCs complexes and directed their differentiation into OST and chondrocytes.*

Saha Institute of Nuclear Physics, Kolkata, India**Jun 2009 - Aug 2009**

- Advisor: Prof. Udayaditya Sen. *Cloned, expressed and purified the low molecular weight protein tyrosine phosphatase [LMW-PTP-121], isolated from Vibrio cholerae0395.*

PROFESSIONAL SKILLS

Coding: MATLAB, Python, Bash, LaTeX, GitHub, Microsoft Office Suite, Adobe Illustrator**Spectroscopy:** NMR, UV-Vis, Transient Absorption, IR, Broadband pump-probe**Instrumentation:** Optical Parametric Amplifiers, Optical alignment, Laser maintenance, Ti:Saph and HeNe lasers**Interpersonal:** Time management, Self motivation, Result oriented, Team management, Conflict resolution**REFERENCES:** AVAILABLE UPON REQUEST.
