

Preeta Pratakshya

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Education

- Ph.D. in Chemistry** Jul 2017 - Present
University of California, Irvine, Irvine, USA
- M.S. in Chemistry** Jul 2017 - Jun 2020
University of California, Irvine, Irvine, USA
- Integrated M.Sc. (B.S. - M.S.) in Chemistry** Aug 2012 - Jun 2017
National Institute of Science Education and Research, Bhubaneswar, India

Technical Skills

Molecular Biology: Protein expression and purification, HPLC, SDS-PAGE, Mass Spectrometry, Polymerase Chain reaction (PCR), Site-directed mutagenesis

Spectroscopy: Circular Dichroism (CD) spectroscopy, UV/Vis Absorption Spectroscopy, Fluorescence Spectroscopy, Dynamic Light Scattering (DLS), Multi-angle Light Scattering (MALS), Small-Angle X-Ray Scattering (SAXS)

Materials Science: Electrochemical Impedance Spectroscopy (EIS), Atomic Force Microscopy (AFM), Optical Microscopy, Surface Profilometry, Dropcasting, Spincoating, Inkjet Printing, Fabrication of electrical devices using e-beam evaporation

Chemistry: Conventional multi-step synthesis, purification and characterization of organic and inorganic compounds, NMR spectroscopy

Softwares: VMD, ChemDraw, IGOR Pro, Origin, Adobe Illustrator, Microsoft Office

Publications

- P. Pratakshya, N. E. Tolouei, A. L. Kwansa, M. Kovačič, R. Kautz *et al.*, Structure-electrical function relationships of a model cephalopod protein variant. *Manuscript in Preparation* (2022).
- A. Chatterjee*, P. Pratakshya*, A. L. Kwansa, N. Kaimal, A. H. Cannon *et al.*, Predictive squid-inspired refractive index engineering of cells, vesicles, and nanoparticles. *ACS Biomater. Sci. Eng. In Revision* (2022). (* denotes co-first authorship)
- C. Xu, D. J. Dibble, A. Mukazhanova, P. Pratakshya, R. Kurakake *et al.*, Octopus-inspired camouflage and signaling systems from an exceptionally stable nonacene. *Nat. Commun. In Revision* (2022).
- M. J. Umerani, H. Yang, P. Pratakshya, J. S. Nowick, A. A. Gorodetsky, An aza-Diels–Alder route to quinoline-based unnatural amino acids and polypeptide surrogates. *RSC Adv.* **11**, 14132-14139 (2021). [\[Article\]](#)
- C. Xu, N. Kandel, X. Qiao, M. I. Khan, P. Pratakshya *et al.*, Long-range proton transport in films from a reflectin-derived polypeptide. *ACS Appl. Mater. Interfaces* **13**, 20938-20946 (2021). [\[Article\]](#)
- M. J. Umerani*, P. Pratakshya*, A. Chatterjee, J. A. C. Sanchez, H. S. Kim *et al.*, Structure, self-assembly, and properties of a truncated reflectin variant. *Proc. Natl. Acad. Sci. U.S.A* **117**, 32891-32901 (2020). (* denotes co-first authorship) [\[Article\]](#) [\[Press\]](#) [\[Press\]](#)

- Y. Lu*, **P. Pratakshya***, A. Chatterjee, X. Jia, D. D. Ordinario *et al.*, Aqueous processing of the conductive cephalopod protein reflectin via inkjet printing. *APL Mater.* **8**, 101113 (2020). (* denotes co-first authorship) [\[Article\]](#) [\[Press\]](#)

Presentations

- **P. Pratakshya**, A. Chatterjee, N. Kaimal, A. A. Gorodetsky, Structure, assembly, and properties of cephalopod protein-based materials. Pacificchem 2021, December 16-21, 2021; The International Chemical Congress of Pacific Basin Societies (*Oral Presentation*).
- **P. Pratakshya**, N. E. Tolouei, A. A. Gorodetsky, Cephalopod protein-based materials: structure, self-assembly and applications. 2021 MRS Fall Meeting and Exhibit, Boston, MA, November 29 - December 2, 2021; Materials Research Society (*Oral Presentation*).
- **P. Pratakshya**, A. A. Gorodetsky, Structure, assembly, and tunable properties of a cephalopod protein-based material. ACS Fall 2021 Meeting, Atlanta, GA, August 22-26, 2021; American Chemical Society (*Oral Presentation*).
- A. A. Gorodetsky, **P. Pratakshya**, Dynamic materials inspired by cephalopods. SPIE Vol. 11810, Organic and Hybrid Sensors and Bioelectronics XIV, San Diego, CA, August 1-5, 2021; SPIE – the international society for optics and photonics (*Invited Presentation*). [\[Link\]](#)
- A. A. Gorodetsky, **P. Pratakshya**, Dynamic materials inspired by cephalopods. IEEE Nano 2021, July 28-30, 2021; IEEE (*Invited Presentation*).
- **P. Pratakshya**, A. A. Gorodetsky, Tunable assembly and refractive index of a cephalopod protein-based material. OSA Advanced Photonics Congress 2021 - Novel Optical Materials and Applications, July 26-29, 2021; Optical Society of America (*Oral Presentation*). [\[Link\]](#)
- **P. Pratakshya**, A. A. Gorodetsky, Structure, assembly, and properties of a cephalopod protein-based material. UCI AGS Virtual Graduate Research Symposium, April 24, 2021; University of California, Irvine (*Oral Presentation*).
- **P. Pratakshya**, G. Ilc, M. Kovačič, A. Chatterjee, J. Plavec, A. A. Gorodetsky, Structure, tunable self-assembly, and optical properties of a model cephalopod protein. 2021 Virtual MRS Spring Meeting and Exhibit, April 17-23, 2021; Materials Research Society (*Oral Presentation*).
- **P. Pratakshya**, G. Ilc, M. Kovačič, A. Chatterjee, R. Kautz, J. Plavec, A. A. Gorodetsky, Structure, assembly and material properties of model cephalopod proteins. University of California Chemical Symposium, March 25-27, 2021 (*Oral Presentation*).
- **P. Pratakshya**, A. Chatterjee, R. Kautz, A. A. Gorodetsky, Structure, assembly, and material properties of model cephalopod proteins. 2020 Virtual MRS Spring/Fall Meeting and Exhibit, November 27 - December 4, 2020; Materials Research Society (*On-demand Oral Presentation*).
- A. Chatterjee, J. A. C. Sanchez, M. J. Umerani, **P. Pratakshya**, B. Sartori, B. Marmioli, G. Ilc, M. Kovačič, R. Kautz, S. Bernstorff, J. Plavec, A. A. Gorodetsky, Structural and electrical characterization of a cephalopod protein. BioEL 2019 (*Poster*).

Research Grants

- Co-authored grant proposal for Office of Naval Research (ONR): Programmable Assembly of Nanoscale Circuit Components Within Living Cells
Principal Investigator: Alon A. Gorodetsky
Funding: \$600,000 over 3 years (2020–2023)

- Co-authored grant proposal for Defense University Research Instrumentation Program (DURIP):
A Microscope for Nanoscale Electrical Measurements
Principal Investigator: Alon A. Gorodetsky
Funding: \$441,620 (2022-2023)

Research Experience

Graduate Research Assistant

Jan 2018–Present

*Gorodetsky Research Group, Department of Chemistry
University of California, Irvine, Irvine, USA*

Topic: Structure, Assembly, and Material Properties of Cephalopod Proteins called Reflectins

- Established protocols for the high-throughput expression of reflectin proteins in *E. coli*.
- Expressed, purified, and characterized reflectin proteins, with and without isotope labeling, using *High Performance Liquid Chromatography (HPLC)*, *SDS-PAGE*, and *Mass Spectrometry*.
- Developed protocols for processing aqueous solutions of reflectin proteins and precisely controlling their structure, assembly, and optical properties.
- Investigated the structure and stimuli-responsive assembly of reflectin proteins using *Atomic Force Microscopy (AFM)*, *Dynamic Light Scattering (DLS)*, *Small Angle X-Ray Scattering (SAXS)*, and multiple spectroscopy techniques.
- Fabricated protein-based thin films and electrical devices using *Dropcasting*, *Spincoating* and *Inkjet Printing*.
- Investigated the electrical properties of conductive protein films in humidified environments using *Electrochemical Impedance Spectroscopy (EIS)*.
- Assisted with refractive index measurements of protein solutions using holotomography.
- Characterized unnatural amino acids and polypeptides, protein-polymer bioconjugates, and organic molecules using *Fluorescence Spectroscopy*, and *UV/Vis Absorption Spectroscopy*.

Undergraduate Research Assistant

Sep 2015–Apr 2017

*Krishnan Research Group, School of Chemical Sciences
National Institute of Science Education and Research, Bhubaneswar, India*

Topic: Synthesis and Photophysical Studies of Organoboron Complexes for Applications in OLEDs

- Synthesized organoboron complexes with tetraaryl pyrazole-based ligands for opto-electronic applications.
- Characterized the synthesized ligands and organoboron complexes using **Mass Spectrometry**, **Nuclear Magnetic Resonance (NMR) Spectroscopy**, and **X-Ray Crystallography**.
- Studied Aggregation Induced Emission (AIE) and investigated the photophysical properties of the synthesized complexes using **Fluorescence Spectroscopy**.

Research Intern

May 2015–Jul 2015

*Molecular Electronics Lab, Chemistry and Physics of Materials Unit
Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India*

Topic: Measurement of exciton diffusion length in conducting polymers using thickness dependent photoluminescence quenching

- Came up with a method for fabricating polymer (MEH-PPV) films with thickness gradients from 20-200 nm on a single substrate using *Doctor Blading* and *Spincoating*.

- Measured the exciton diffusion length in the fabricated polymer films through *photoluminescence measurements*.

Research Intern

May 2014–Jul 2014

*Mugesh Research Group, Department of Inorganic and Physical Chemistry
Indian Institute of Science, Bangalore, India*

Topic: Development of reporter system for detection of unnatural amino acids and Mutation studies of Protein Tyrosine Phosphatase 1B

- Developed a reporter system for detection of incorporated unnatural amino acids in a living system using β -galactosidase activity and the phenomenon of alpha complementation.
- Designed a mutant PTP1B protein wherein an Isoleucine residue was replaced with a Glycine residue using *Site-directed mutagenesis*.
- Optimized protocols for the high-throughput production of the designed PTP1B mutant.

Teaching and Mentorship Experience

Graduate Teaching Assistant

Sep 2017–Aug 2018

Department of Chemistry, UC Irvine

Courses: CHEM1LC, CHEM 1LD, CHEM 1LE, CHEM H2LB/M2LB: General Chemistry Labs

- Led brief discussion sessions followed by 3h laboratory sessions for 50 undergraduate students.
- Evaluated weekly lab reports and graded quarterly exams, attended weekly TA meetings, held weekly office hours, and provided feedback to students within set deadlines.
- Proctored and graded exams for different lower division general chemistry and upper division organic chemistry courses.

Graduate Teaching Assistant

Sep 2019–Dec 2019

Department of Chemical and Biomolecular Engineering, UC Irvine

Course: ENGR1A : General Chemistry for Engineers

- Led discussion sessions for 100 undergraduate students twice weekly.
- Graded exams, developed course material for discussion, and held weekly office hours.
- Occasionally lectured a class of 200 undergraduate students.

Chemistry TA Mentor

Sep 2019–Jun 2020

Department of Chemistry, UC Irvine

- Trained and mentored incoming Chemistry graduate students.
- Guided students on effective teaching practices and time management.
- Observed students teach and provided them with critical feedback.

Grad InterConnect Peer Mentor

Apr 2019–Dec 2021

Graduate Division, UC Irvine

- Utilized strong communication skills in corresponding with incoming international graduate students weekly with valuable resources and information.
- Authored blog articles to help provide useful resources and support for graduate students.
- Organized social and networking events for students to encourage engagement.

Lab Safety Representative and Team Leader

Sep 2020–Present

Gorodetsky Research Group, University of California, Irvine

- Conducted routine safety checks, and conducted safety training for new members joining the lab.
- Served as a team leader, and trained and mentored 2 undergraduate students, 3 junior graduate students and 2 summer interns on independent research projects.

Outreach and Science Communication

Science Writer

Apr 2019–Mar 2020

The Loh Down on Science, Irvine

- Researched current scientific journal articles and wrote science scripts for the "Loh Down on Science" radio show, a humorous and informative podcast on popular scientific research, broadcast on various streaming/podcast sites (including npr.org and kpcc.org). [\[Link\]](#)
- Edited science scripts written by peer writers.

Production Manager

Jun 2019–Present

Brews and Brains, UC Irvine

- Mentored and provided feedback to graduate students on presenting their research to the general public.
- Produced, edited and prepared video content for uploading on social media. [\[Link\]](#) [\[Link\]](#)

Academic Merits and Fellowships

- Recipient of **INSPIRE** (Innovation in Science Pursuit for Inspired Research) fellowship funded by the Government of India, *Aug 2012–Jun 2017*.

Professional Affiliations

Society of Photo-Optical Instrumentation Engineers (SPIE), Optical Society of America (OSA), Materials Research Society (MRS), and American Chemical Society (ACS)

Professional Services and Leadership Roles

- Member, Association of Women in Science, UC Irvine, *Jun 2019–Present*.
- Secretary, IotaSigmaPi, *Calcium Chapter*, UC Irvine, *Jun 2020–Present*.
- National Convention Coordinator, IotaSigmaPi, *Calcium Chapter*, UC Irvine, *Jun 2019–May 2020*.
- Outreach Coordinator, IotaSigmaPi, *Calcium Chapter*, UC Irvine, *Jun 2018–May 2019*.
- Event Writer, Regional Science Olympiad, Orange County, CA, *2018 and 2019*.
- Certificate in Teaching Excellence, UC Irvine, *Dec 2019*.
- Certificate in Mentoring Excellence, UC Irvine, *May 2019*.
- Certificate in Course Design, UC Irvine, *Jul 2018*.
- Former President and Founding member of *Zaariya* - a student body organization that is involved in activities such as teaching and mentoring children from poor socio-economic backgrounds in India, *Sep 2015–Jun 2017*. [\[Link\]](#)