Pratik Kumar, PhD

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PROFESSIONAL APPOINTMENTS

2019– **Postdoc, laboratory of Dr. Luke Lavis**, HHMI-Janelia Research Campus, VA, USA
Research interests: (1) Genetically targeted multifunctional dyes for protein imaging and manipulation, (2) far-red dyes for genetic code expansion click imaging, (3) photoactivatable dyes for single-molecule imaging of mRNA and proteins, (4) cell-surface tethered dyes for cell-type specific receptor pharmacology, (5) and photoactivatable reagents.

EDUCATION

2013–19 **PhD in Chemistry, laboratory of Dr. Scott Laughlin**, Stony Brook University, NY, USA
Cyclopropene-neurotransmitters and caged-cyclopropenes for bioorthogonal labeling

2008–13 **MS/BS in Chemistry, laboratory of Dr. Rituparna Roy**, IISER-Kolkata, WB, India
Conformational studies of gramicidin-inspired alternating LD peptides

2009–11 **Diploma in Chemistry, laboratory of Dr. Jayanta Haldar**, JNCASR, KA, India
Biodegradable antibacterial gemini surfactants

2023 Junior Scientist Workshop on Imaging Techniques and Molecular Tools for Biology, Janelia

2020 Scientists Teaching Science, HHMI Janelia Research Campus, VA, USA

2018 Optical Microscopy and Imaging (OMIBS), Marine Biological Laboratory, Woods Hole, USA

2015–18 Science Communication, Alan Alda Center for Communicating Sciences, NY, USA

PUBLICATIONS (Google Scholar | ORCID)

1. **Pratik Kumar***, Alina Gutu*, Amelia Waring, Timothy A. Brown, Luke D. Lavis, & Alison G. Tebo. Transforming chemigenetic bimolecular fluorescence complementation systems into chemical dimerizers using chemistry. **In Revision**. bioRxiv: doi.org/10.1101/2023.12.30.573644
2. Motokazu Uchigashima, Risa Iguchi, Kazuma Fujii, **Pratik Kumar**, Manabu Abe, Motohiro Nozumi, Michihiro Igarashi, Kenji Sakimura, Ryoma Bise, Luke D Lavis, & Takayasu Mikuni. Single-cell synaptome mapping of endogenous protein subpopulations in mammalian brain. **In Revision**.
3. Antonio Fiore, Guoqiang Yu, Jason J. Northey, Ronak Patel, Thomas A. Ravenscroft, Richard Ikegami, Wiert Kolkman, **Pratik Kumar**, Tanya L. Dilan, Virginia M.S. Ruetten, Misha B. Ahrens, Hari Shroff, Shaohe Wang, Valerie M. Weaver, & Kayvon Pedram. Imaging the extracellular matrix in live tissues and organisms with a glycan-binding fluorophore. **Nature Methods** (accepted). bioRxiv: doi.org/10.1101/2024.05.09.593460
4. **Pratik Kumar**, Jason D. Vevea, Ariana N. Tkachuk, Kirby Campbell, Emma T. Watson, Anthony X. Ayala Jonathan B. Grimm, Edwin R. Chapman, David J. Solecki, & Luke D. Lavis. Optimizing multifunctional fluorophores for intracellular labeling. **In revision**. bioRxiv: doi.org/10.1101/2022.07.02.498544 *preLights* | *Janelia News*
5. Brittany M. White, **Pratik Kumar**, Amanda N. Conwell, Kane Wu & Jeremy M. Baskin. Lipid expansion microscopy. **JACS**, 144, 40, 18212–217, 2022. *Cornell Chronicle*
6. **Pratik Kumar** & Luke D. Lavis. Melding synthetic molecules and genetically encoded proteins to forge new tools for neuroscience. **Annual Review of Neuroscience**, 45, 131–50, 2022.
7. Sambashiva Banala, Ariana Tkachuk, Ronak Patel, **Pratik Kumar**, Timothy Brown, & Luke D. Lavis. 2,7-Diaminobenzopyrylium dyes are live-cell mitochondrial stains. **ACS Bio Med Chem Au**, 2, 3, 307–12, 2022.
8. **Pratik Kumar**, David Shukhman, Frank M. Camarda, & Scott T. Laughlin. Stable cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 60, 1476–80, 2019.
9. **Pratik Kumar**, Omar Zainul, Frank M. Camarda, Ting Jiang, John Mannone, & Scott T. Laughlin. Caged cyclopropenes with improved tetrazine ligation kinetics. **Organic Letters**, 21, 3721–25, 2019.

10. Ting Jiang, **Pratik Kumar**, Wei Huang, Wei-Siang Kao, Adrian O. Thompson, Frank M. Camarda, & Scott T. Laughlin. Modular enzyme- and light-based activation of the cyclopropene-tetrazine ligation. **ChemBioChem**, 20(17), 2222–26, 2019.
11. **Pratik Kumar** & Scott T. Laughlin. Modular activatable bioorthogonal reagents. **Methods in Enzymology**, 622, 153–82, 2019.
12. **Pratik Kumar**, Ting Jiang, Omar Zainul, Alyssa N. Preston, Joshua D. Farr, Sining Li, Pavit Suri, & Scott T. Laughlin. Lipidated cyclopropenes via a stable 3-N spirocyclopropene scaffold. **Tetrahedron Letters**, 59, 3435–38, 2018.
13. **Pratik Kumar***, Ting Jiang*, Sining Li, Omar Zainul, & Scott T. Laughlin. Caged cyclopropenes for controlling bioorthogonal reactivity. **Organic & Biomolecular Chemistry**, 16(22), 4081–85, 2018. *Royal Society of Chemistry Blog*
14. **Pratik Kumar**, Omar Zainul, & Scott T. Laughlin. Inexpensive multigram-scale synthesis of cyclic enamines and 3-N spirocyclopropyl systems. **Organic & Biomolecular Chemistry**, 16(4), 652–56, 2018.
15. **Pratik Kumar**, David Shukhman, & Scott T. Laughlin. A photocaged, cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 57, 5750–52, 2016.
16. Jiaul Hoque, **Pratik Kumar**, Vinod K. Aswal, & Jayanta Haldar. Aggregation properties of amide bearing cleavable gemini surfactants by small angle neutron scattering and conductivity studies. **Journal of Physical Chemistry B**, 116(32), 9718–26, 2012.
17. Jiaul Hoque, Padma Akkapeddi, Venkateswarlu Yarlagadda, Divakara SSM Uppu, **Pratik Kumar**, & Jayanta Haldar. Cleavable cationic antibacterial amphiphiles: synthesis, mechanism of action, and cytotoxicities. **Langmuir**, 28(33), 12225–34, 2012. *Indian News*

In Advance preparation (Total = 4, First author = 2, Collaborator = 2)

18. **Pratik Kumar**, Made Budiarta, Markus Sauer, Luke D. Lavis & Gerti Beliu. A general strategy to improve the fluorogenicity of far-red emitting tetrazine dyes for imaging of unnatural amino acid containing proteins.
19. **Pratik Kumar**, Jonathan Grimm, Katie Holland, Ariana Tkachuk & Luke D. Lavis. Novel photoactivatable fluorophore for live-cell single-molecule imaging of biomolecules.

Patents

1. Shu-Hsien Sheu, **Pratik Kumar** and Luke D. Lavis. Biotin-free proximity labeling. Provisional patent application 63/590534. 2023.
2. Luke D. Lavis and **Pratik Kumar**. Compounds and compositions comprising fluorophores for use in both visualization and purification. Provisional patent application 63/476193. 2022.
3. Scott T. Laughlin, **Pratik Kumar**, Ting Jiang, Wei Huang. Compositions and methods for modular control of bioorthogonal ligation. WO2020113077. 2020.

Honors / Awards

Janelia Postdoc Life, www.janelia.org/node/47543 2023
Outstanding Doctoral Student, Maria Tzamarioudaki Memorial Award, Stony Brook University 2019
Outstanding Service award, Department of Chemistry, Stony Brook University 2019
New York State Graduate Student Employee Union Professional Development Award 2019
The Histochemical Society Travel Award 2018
Marine Biological Laboratory Scholarship 2018
Distinguished Travel Award, Graduate Student Organization, Stony Brook University 2018
Nominated by the Dept. of Chemistry and then selected from the pool of all university-wide nominations
ACS Biological Chemistry Travel Award 2017

Best poster Award, Institute of Chemical Biology & Drug Discovery, Stony Brook University 2017
SUNY Research Foundation Professional Development Award 2017
Research Access Project Award, Graduate Student Organization, Stony Brook University 2015/17/19
Sigma Xi Research Achievement, Stony Brook University Chapter 2017
ACS Interdivisional Sci-Mix, ACS Biological Chemistry division, ACS-San Francisco 2017
3MT-People's Choice Award (3-minute thesis), Stony Brook University 2017
Departmental Distinguished Research Award, Stony Brook University 2016
German Research Foundation Travel Award, Lindau Nobel Laureate Meetings, Germany 2013
Dept. of Science & Technology (India) Travel Award, Asian Science Camp, South Korea 2011
POCE Fellowship, JNCASR, India 2009–11
INSPIRE Fellowship, Department of Science & Technology, India 2008–13

PROFESSIONAL SERVICE

Reviewer | Journals: Angewandte Chemie (2023–), Chemistry (2023–), Nature Communications (2022–), Organic & Bimolecular Chemistry (2020–), ChemBioChem (2020–), Journal of Materials Chemistry (2022–).
Meetings: European Molecular Imaging Meeting (2021), Gordon Research Seminars-Bioorganic Chemistry (2022), 70th Lindau Nobel Laureate Meetings (2022), American Society of Cell Biology-Cell Bio (2022)
COMPASS (Committee for Postdocs and Students) Associate**,** American Society for Cell Biology 2022–
Chair, Gordon Research Seminars-Bioorganic Chemistry 2022
President, Janelia Association of Research Scientists 2022–2023
Officer, Janelia Association of Research Scientists 2021–22
Moderator, 70th Lindau Nobel Laureate Meeting Open Exchange Sessions 2021
Discussion leader, Gordon Research Seminars-Bioorganic Chemistry 2019
President, Graduate Chemical Society, SBU Apr 2017–Apr 2019
President, Student Invited Speaker Committee, SBU Spring 2017
Moderator/organizer, Grad. Chemical Society career panel on non-academic careers, SBU Spring 2016
Moderator, Graduate Career Association career panel on entrepreneurship, SBU Fall 2015
Vice-President, Graduate Career Association, SBU Fall 2015–Spring 2016
Senator for Chemistry at Graduate Student Organization, SBU 2015–Spring 2018
Public Relations Officer, Graduate Chemical Society, SBU Spring 2015–Apr 2017

SELECTED ORAL PRESENTATIONS

INVITED

1. **inStem**, Bangalore, India 2023
   Genetically targeted fluorescent dyes for imaging and manipulation
2. **IISER-Bhopal** Chemistry-Biology-Medicine Symposium 2023
   Genetically targeted fluorescent dyes for imaging and manipulation
3. **Sabarmati Young Researcher Seminar Series**, Biological Engineering, IIT Gandhinagar 2021
   Multifunctional fluorescent dyes as molecular tools beyond imaging
4. **Project SEED, American Chemical Society** (virtual) 2021
   Illuminating biology through fluorescent dyes
5. **SUNY-Suffolk Community College**, Department of Natural Sciences, NY, USA 2018
   Activatable bioorthogonal reactions for biology

CONFERENCES / WORKSHOPS

1. **FASEB, The Optical Probes Conference: Discovery to Application**, CA, USA 2023
   Genetically targeted fluorescent dyes for imaging and manipulating intracellular biomolecules
2. **Junior Scientist Workshop on Imaging Techniques and Molecular Tools for Biology**, VA, USA 2023
   Genetically targeted fluorescent dyes for imaging and manipulation
3. **Young Investigators' Meeting/PDF**, Flash talk, Gandhinagar, India 2023

Genetically targeted fluorophores for imaging and manipulation

4. **Gordon Research Conference**, Bioorganic Chemistry, Flash talk, NH, USA 2022
   Multifunctional fluorophores as molecular tools beyond imaging
5. **Chemical Biology and Physiology**, Oregon Health & Science University, OR, USA 2022
   Multifunctional fluorophores as molecular tools beyond imaging
6. **Annual Janelia Symposium**, HHMI-Janelia Research Campus, VA, USA 2022
   Multifunctional fluorophores as molecular tools beyond imaging
7. **International Conference on Nanoscopy**, Leibniz Institute of Photonic Technology (virtual) 2021
   Multifunctional fluorophores as molecular tools beyond imaging
8. **Dana-Farber Cancer Institute,** Chemical Biology Symposium, Flash talk (virtual) 2021
   Multifunctional fluorophores as molecular tools beyond imaging
9. **Probe Fest,** HHMI-Janelia Research Campus, Flash talk, VA, USA 2018
   Modular activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity
10. **New York Academy of Sciences**, Chemical Biology Symposium, NY, USA 2018
    Activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity

Selected Poster Presentations

1. **Gordon Research Seminars** & **Gordon Research Conference**, Bioorganic Chemistry, NH, USA 2022
   Multifunctional fluorophores as molecular tools beyond imaging
2. **EMBO/EMBL**, Seeing is Believing: Imaging the Molecular Processes of Life, VA, USA 2021
   Multifunctional fluorophores as molecular tools beyond imaging
3. **HHMI-Janelia Research Campus**, ProbeFest, VA, USA 2018
   Light- and enzyme-activatable cyclopropenes
4. **Rockefeller University**, Tri-Institutional Chemical Biology Symposium, NY, USA 2018
   Caged cyclopropenes for spatiotemporal control of bioorthogonal reactivity
5. **Gordon Research Seminars** & **Gordon Research Conference**, Bioorganic Chemistry, NH, USA 2018
   Caged cyclopropenes for spatiotemporal control of bioorthogonal reactivity
6. **NERCBI and Yale Chemical Biology Symposium**, CT, USA 2018
   Caged cyclopropenes for spatiotemporal control of bioorthogonal reactivity
7. **Icahn School of Medicine–Mount Sinai** & **ICB&DD–Stony Brook University** symposium on 2017
   Frontiers in Chemical Biology and Drug Discovery, NY, USA | **Best poster award**
   3*N* spirocyclopropenes provide spatiotemporal control of bioorthogonal reactivity
8. **New York Academy of Sciences**, Chemical Biology Symposium, NY, USA 2017
   Cyclopropene neurotransmitters for biorthogonal imaging of neural circuits
9. **Gordon Research Seminars** & **Conference**, High-Throughput Chemistry & Chemical Biology, USA 2017
   Caged cyclopropenes for spatiotemporal control of bioorthogonal reactivity
10. **ACS National Meeting** & **ACS interdivisional Sci-Mixer presentation**, CA, USA 2017
    Cyclopropene neurotransmitters for biorthogonal imaging of neural circuits
11. **Stony Brook University**, Chemistry Research Day, NY, USA 2015
    Cyclopropene analogs of neurotransmitters for illuminating neural circuits
12. **Stony Brook University**, Chemistry Research Day, NY, USA 2014
    Fluorescent boronic acid probe as transsynaptic tracer of neural circuitry

Teaching Experience (Total = 5 Semesters)

Graduate assistant, NMR facilities, SBU 2018, Spring 2019

Trained undergraduate, graduate, and postdoctoral trainees on setting up and analyzing ^{1}H, ^{13}C, COSY, and DEPT NMR on 400/500/700 MHz NMR instruments. Helped with routine maintenance of NMR instruments.

Graduate assistant, Mass spectrometry facilities, SBU 2018, Spring 2019

Trained undergraduate, graduate, and postdoctoral trainees on setting up and analyzing liquid samples on ESI-mass spectrometer and solid samples on TLC-inject mass spectrometer. Performed high-resolution mass spectroscopy of liquid samples and helped maintain the mass spectrometers.

Teaching assistant, Advanced organic chemistry lab, SBU — Spring 2015

Led ~4 lectures on NMR and weekly laboratory course for ~30 chemistry majors on how to set up multistep organic reactions; monitor the progress of reactions; purify reaction intermediates; analyze GC data; acquire and analyze IR data; analyze ^{1}H & ^{13}C NMR data; report spectroscopic and experimental data; and follow proper lab-safety techniques.

Teaching assistant, Undergraduate organic chemistry lab, SBU — Fall 2013–Spring 2014

Led a weekly laboratory course for ~30 pre-med students on how to set up organic reactions; isolate and purify reaction products; analyze GC data and IR data; report experimental data; and follow proper lab-safety techniques.

MENTORING EXPERIENCE (TOTAL = 14)

3 PhD students (rotation and 1st year of their PhD):

- Wei Huang (Chemistry/Chemical Biology, co-author on two manuscripts) — Nov 2017–Dec 2018
- Wei-Siang Kao (Chemistry/Chemical Biology, co-author on two manuscripts) — Nov 2017– Dec 2018
- Ting Jiang (Chemistry/Chemical Biology, co-author on four manuscripts) — Nov 2016–Dec 2017

3 PhD rotation students: Lei Chen, Yilin Ma, Beilei Jiang — 2016, 2017

1 MS student: Sining Li (Chemistry, co-author on two manuscripts) — Jan 2016–Apr 2017

6 Undergraduate students:

- Nathan Brown (Janelia Open Chemistry summer student) — Summer 2023
- Nayarit Tineo (Biology, worked with Omar Zainul through SBU-INSPIRE program) — Spring 2018
- John Mannone (Chemistry, co-author on one manuscript) — Nov 2017–Apr 2019
  Awarded URECA summer research fellowship
- Frank Camarda (Pharmacology, co-author on two manuscripts) — Nov 2017–Apr 2019
- Omar Zainul (Pharmacology, and co-author on four manuscripts) — Sep 2016–Apr 2018
  Awarded URECA summer research fellowship and Sigma-Xi Undergraduate Research Award
- David Shukhman (Biochemistry, co-author on two manuscripts) — Aug 2014–Apr 2016

1 High School student: Pavit Suri (W.T. Clarke High School, co-author on one manuscript) — Summer 2017

OUTREACH

Moderator/American Society for Cell Biology Seminar, "How to approach new collaborations" — 2022

Project SEED Speaker, American Chemical Society — 2021

Science Coach, American Chemical Society, Developed chemistry demos on dyes for high-school students — 2020

Poster Judge, Annual Biomedical Research Conference for Minority Students (ABRCMS) — 2020

Janelia RESET team, Biology demos and labs at a nearby diverse and low-income elementary school — 2020, 2022

"Life as a scientist and career in scientific research", Suffolk Community College, NY, USA — 2018

Science Fair Judge for WAC Lighting Foundation Invitational science fair, NY — 2017, 2018, 2021

Science Competition Judge for 5th Annual Nassau County science fair, NY — 2017

3MT Judge (3-minute thesis), SBU — 2017

Research photo contest, Graduate Chemical Society, SBU (winner) — 2016, 2017

Co-Founder, BrainChem, Graphical interface to explain chemistry and ecology tidbits to non-scientists — 2016-18