

Pratik Kumar, PhD

Postdoctoral Associate, HHMI-Janelia Research Campus, VA, USA

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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 Halder**, 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. 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. **Submitted**, 2023.
2. **Pratik Kumar**, Jason D. Vevea, Edwin R. Chapman & Luke D. Lavis. Using Si-rhodamines as linkers to improve cell-permeability. **In revision**. Bioarxiv: doi.org/10.1101/2022.07.02.498544. *preLights* | *Janelia News*
3. Brittany M. White, **Pratik Kumar**, Amanda N. Conwell, Kane Wu & Jeremy M. Baskin. Lipid expansion microscopy. **JACS**, 144, 40, 18212–217, 2022. *Cornell Chronicle*
4. **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.
5. 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.
6. **Pratik Kumar**, David Shukhman, & Scott T. Laughlin. Stable cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 60, 1476–80, 2019.
7. **Pratik Kumar**, Omar Zainul, Frank Camarda, Ting Jiang, John Mannone, & Scott T. Laughlin. Caged cyclopropenes with improved tetrazine ligation kinetics. **Organic Letters**, 21, 3721–25, 2019.
8. Ting Jiang, **Pratik Kumar**, Wei Huang, Wei-Siang Kao & Scott T. Laughlin. Modular enzyme- and light-based activation of the cyclopropene-tetrazine ligation. **ChemBioChem**, 20(17), 2222–26, 2019.
9. **Pratik Kumar** & Scott T. Laughlin. Modular activatable bioorthogonal reagents. **Methods in Enzymology**, 622, 153–82, 2019.
10. **Pratik Kumar**, Ting Jiang, Omar Zainul, A. Preston, J. Farr, S. Li, Pavit Suri, & Scott T. Laughlin. Lipidated cyclopropenes via a stable 3-N spirocyclopropene scaffold. **Tetrahedron Letters**, 59, 3435–38, 2018.

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11. **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*
12. **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.
13. **Pratik Kumar**, David Shukhman, & Scott T. Laughlin. A photocaged, cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 57, 5750–52, 2016.
14. 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.
15. Jiaul Hoque, Padma Akkapeddi, Venkateswarlu Y., 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 PREPARATION (TOTAL = 5, FIRST AUTHOR = 2, COLLABORATOR = 3)

16. **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 live-cell single-molecule imaging of non-canonical amino acid containing proteins.
17. **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, Luke D. Lavis and **Pratik Kumar**. Biotin-free proximity labeling in live cells with chloroalkane-tyramide. In submission, 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
<i>Nominated by the Dept. of Chemistry and then selected from the pool of all university-wide nominations</i>	
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

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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–), Nature Communications (2022–), Organic & Biomolecular Chemistry (2020–), ChemBioChem (2020–), Journal of Materials Chemistry (2022–). Meetings: European Molecular Imaging Meeting (2021), Gordon Research Seminars-Bioorganic Chemistry (2022), 70 th 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 , 70 th 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	

CONFERENCE

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. Young Investigators' Meeting/PDF , Flash talk, Gandhinagar, India	2023
Genetically targeted fluorophores for imaging and manipulation	
5. Gordon Research Conference , Bioorganic Chemistry, Flash talk, NH, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	
6. Chemical Biology and Physiology , Oregon Health & Science University, OR, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	
7. Annual Janelia Symposium , HHMI-Janelia Research Campus, VA, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	

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| 8. International Conference on Nanoscopy , Leibniz Institute of Photonic Technology (virtual)
Multifunctional fluorophores as molecular tools beyond imaging | 2021 |
| 9. Dana-Farber Cancer Institute , Chemical Biology Symposium, Flash talk (virtual)
Multifunctional fluorophores as molecular tools beyond imaging | 2021 |
| 10. Probe Fest , HHMI-Janelia Research Campus, Flash talk, VA, USA
Modular activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity | 2018 |
| 11. New York Academy of Sciences , Chemical Biology Symposium, NY, USA
Activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity | 2018 |

SELECTED POSTER PRESENTATIONS

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

TEACHING EXPERIENCE (TOTAL = 5 SEMESTERS)

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| Graduate assistant, NMR facilities , SBU | 2018, Spring 2019 |
| Trained undergraduate, graduate, and postdoctoral trainees on setting up and analyzing ^1H , ^{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 ^1H & ^{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. | |

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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 three manuscripts)

Jan 2016–Apr 2017

6 Undergraduate students:

Nate 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
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Omar Zainul (Pharmacology, and co-author on four manuscripts)	Sep 2016–Apr 2018
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Awarded URECA summer research fellowship and Sigma-Xi Undergraduate Research Award

David Shukhman (Biochemistry, co-author on two manuscripts)	Aug 2014–Apr 2016
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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