

## Pratik Kumar, PhD

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

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### PROFESSIONAL APPOINTMENTS

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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

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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](#))

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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 Review**, 2024. 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 Review**, 2023.
3. **Pratik Kumar**, Jason D. Vevea, Edwin R. Chapman & Luke D. Lavis. Using Si-rhodamines as linkers to improve cell-permeability. **In second revision**, 2023. bioRxiv: doi.org/10.1101/2022.07.02.498544 *preLights* | *Janelia News*
4. Brittany M. White, **Pratik Kumar**, Amanda N. Conwell, Kane Wu & Jeremy M. Baskin. Lipid expansion microscopy. **JACS**, 144, 40, 18212–217, 2022. *Cornell Chronicle*
5. **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.
6. 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.
7. **Pratik Kumar**, David Shukhman, & Scott T. Laughlin. Stable cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 60, 1476–80, 2019.
8. **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.
9. 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.
10. **Pratik Kumar** & Scott T. Laughlin. Modular activatable bioorthogonal reagents. **Methods in Enzymology**, 622, 153–82, 2019.

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11. **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.
12. **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*
13. **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.
14. **Pratik Kumar**, David Shukhman, & Scott T. Laughlin. A photocaged, cyclopropene-containing analog of the amino acid neurotransmitter glutamate. **Tetrahedron Letters**, 57, 5750–52, 2016.
15. 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.
16. 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 ADVANCE PREPARATION (TOTAL = 4, FIRST AUTHOR = 2, COLLABORATOR = 2)

17. **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.
18. **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, <a href="http://www.janelia.org/node/47543">www.janelia.org/node/47543</a>	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

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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

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

### SELECTED ORAL PRESENTATIONS

#### INVITED

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

#### CONFERENCES / WORKSHOPS

1. <b>FASEB, The Optical Probes Conference: Discovery to Application</b> , CA, USA	2023
Genetically targeted fluorescent dyes for imaging and manipulating intracellular biomolecules	
2. <b>Junior Scientist Workshop on Imaging Techniques and Molecular Tools for Biology</b> , VA, USA	2023
Genetically targeted fluorescent dyes for imaging and manipulation	
3. <b>Young Investigators' Meeting/PDF</b> , Flash talk, Gandhinagar, India	2023
Genetically targeted fluorophores for imaging and manipulation	
4. <b>Gordon Research Conference</b> , Bioorganic Chemistry, Flash talk, NH, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	
5. <b>Chemical Biology and Physiology</b> , Oregon Health & Science University, OR, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	
6. <b>Annual Janelia Symposium</b> , HHMI-Janelia Research Campus, VA, USA	2022
Multifunctional fluorophores as molecular tools beyond imaging	

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| 7. <b>International Conference on Nanoscopy</b> , Leibniz Institute of Photonic Technology (virtual)<br>Multifunctional fluorophores as molecular tools beyond imaging | 2021 |
| 8. <b>Dana-Farber Cancer Institute</b> , Chemical Biology Symposium, Flash talk (virtual)<br>Multifunctional fluorophores as molecular tools beyond imaging            | 2021 |
| 9. <b>Probe Fest</b> , HHMI-Janelia Research Campus, Flash talk, VA, USA<br>Modular activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity   | 2018 |
| 10. <b>New York Academy of Sciences</b> , Chemical Biology Symposium, NY, USA<br>Activatable cyclopropenes for spatiotemporal control of bioorthogonal reactivity      | 2018 |

### SELECTED POSTER PRESENTATIONS

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

### TEACHING EXPERIENCE (TOTAL = 5 SEMESTERS)

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| <b>Graduate assistant, NMR facilities, SBU</b><br>Trained undergraduate, graduate, and postdoctoral trainees on setting up and analyzing $^1\text{H}$ , $^{13}\text{C}$ , COSY, and DEPT NMR on 400/500/700 MHz NMR instruments. Helped with routine maintenance of NMR instruments.   | 2018, Spring 2019     |
| <b>Graduate assistant, Mass spectrometry facilities, SBU</b><br>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.  | 2018, Spring 2019     |
| <b>Teaching assistant, Advanced organic chemistry lab, SBU</b><br>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 $^1\text{H}$ & $^{13}\text{C}$ NMR data; report spectroscopic and experimental data; and follow proper lab-safety techniques. | Spring 2015           |
| <b>Teaching assistant, Undergraduate organic chemistry lab, SBU</b><br>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.   | Fall 2013–Spring 2014 |

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### MENTORING EXPERIENCE (TOTAL = 14)

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**3 PhD students** (rotation and 1<sup>st</sup> 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

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

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**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