

年の瀬も迫る中、皆さんいかがお過ごしでしょうか。3日後に東京で結婚式を迎える鄭です、今は帰省の飛行機でこれを書いています。この半年間はともかく忙しく、しかしその努力をしっかりと成果に変換できたという実感があります。特に、この1年間自分が内々(?)に取り組んできたものたちを表に出せて良かったです。具体的には、ポスドク最初の論文が co-first で Nature に出版されたこと、PhD時代の最後のメインデータをまとめた論文が bioRxiv とはいえ公表できたこと(Nature Chem Biol に投稿してまだ査読実験進行中ですが、ポジティブなデータが集まって来てるのでいけそうな気がしています)、自分史初の単著として総説論文を出せたこと等々、自分がエネルギーを注いだ挑戦たちが実を結んでとても嬉しいです。DEI 関連で始めたイニシエティブ、SLaPWaRP(Stanford Lab Plastic Waste Reduction Project)も順調で、もはや私の手を半ば離れ Sustainable Stanford との共同事業としてどんどん進行中です。現在は2つの建物・8つのラボを対象にゴミの量のベースラインデータを取っています。今後ポスターという intervention を取ってその前後のゴミ量の変化を測定し、2種類のポスターデザインで有効度を比較するという研究を行う予定です。ベースラインデータを取るのに私も協力する予定だったのですが、年の瀬に向けた実験が忙しすぎて計測が滞り気味です…。

Sustainable Stanford の人曰く、ラボで実際に働いている私が自身の first-hand experience を元に彼らにリーチアウトしてきたこと自体に意味があるらしく、「君は忙しいし、僕たちはこれが仕事だから実働は任せて」といったスタンスですが、正直言い出しっぺとして面目が立ちません。とはいえ実際に、研究活動の合間の余暇を結婚式の準備に充てる日々が忙しかったのは事実なので、もう少し余裕の生まれる年明けからまた心機一転頑張ります。

スタンフォードは本当に刺激的な環境で、新しい挑戦が次々と湧いてきて尽きることがありません。エネルギーを注げば注ぐほど成果に変換されていくのはやりがいがあり、それが自分の未来の可能性に繋がっていくと考えるとわくわくします。とはいえ未来の自分も自分であり、つまるところそうして生まれた成果も結局ほとんど自分にとってしか意味がないので、今の自分の人生を犠牲にして頑張ることが目的になるというピットフォールに陥らないよう気を付けなければいけません。9月頃、忙しさの中で自分が何のために頑張っているのか見失い少し迷走していたのですが、一時帰国して自然や家族と触れ合う中で自分自身を見つめ直すことができました。あくまでも今の自分がこれをやりたい!という気持ちを大事にして、これからも精進していきたいです。

最近、CV を大幅にアップデートする機会がありました。「学部時代に CV を書いて来なさいと言って持ってきたのはたったの3行だったね」と当時の指導教官に半ば馬鹿にされていた私の CV も、今はだいぶ立派になったものだとしみじみしました。ここまで私の成長をサポートしてくださった船井財団への感謝の気持ちとして添付しておきます。これからも出来ることをコツコツと頑張ります。

# Reika Tei, Ph.D.

## PERSONAL STATEMENT

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My research interests lie in protein engineering, directed evolution, and lipid biology. My PhD work at Jeremy Baskin's Lab focused on developing molecular tools to study lipid signaling in mammalian cells. A highlight of this work was the development of the *membrane editor*<sup>publications 3,7,8</sup>, a tool designed to modify phospholipid head groups on the membrane of live cells. In my postdoctoral studies at Alice Ting's Lab, I have been engineering synthetic receptors and enzymes for programmable cell behaviors and recording. A key achievement has been the development of *PAGER*<sup>publication 11</sup> (programmable antigen-gated engineered receptor), a synthetic GPCR platform that couples the detection of soluble and surface antigens to diverse outputs such as transgene expression, G-protein signaling, and real-time fluorescence. PAGER achieves this functionality through a modular design: a peptide inhibitor creates an auto-inhibited state, while a binder for the target antigen is strategically inserted to release this inhibition upon antigen binding. Building on the PAGER concept, I have also been developing proximity-labeling enzymes that are activated by a protein of interest. Looking ahead, I plan to establish my own lab to develop molecular tools that decipher and manipulate the complex and dynamic networks of membranes, proteins, and lipids.

## EDUCATION AND TRAINING

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2022–present	<b>Stanford University</b> , Palo Alto, CA, USA	
	Postdoctoral Researcher	Research Advisor: Prof. Alice Ting
2016–2022	<b>Cornell University</b> , Ithaca, NY, USA	
	Ph.D. in Chemistry and Chemical Biology	Research Advisor: Prof. Jeremy Baskin
2012–2016	<b>The University of Tokyo</b> , Tokyo, Japan	
	B.Eng. in Chemistry and Biotechnology	Research Advisor: Prof. Takuzo Aida

## HONORS AND AWARDS

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2024–present	<b>Leading Edge Fellow</b>	
2024	<b>DBC Young Investigator Award</b> , ACS Division of Biochemistry and Chemical Biology	
2023–present	<b>Life Sciences Research Foundation Fellow</b>	
2023	<b>JSPS Overseas Research Fellow</b>	
2022	<b>Tunis Wentink Prize</b> , Cornell University	
2021	<b>Norton B. Gilula Award</b> , American Society for Cell Biology	
2021	<b>Hsien and Daisy Yen Wu Scholarship Award</b> , Cornell University	
2020–2022	<b>Honjo International Scholar</b>	
2019	<b>Best Graduate Student Talk Award</b> , Molecular Membrane Biology Gordon Research Seminar	
2018–2020	<b>Funai Overseas Scholar</b>	
2017–2018	<b>Cornell Graduate Fellow</b>	

## RESEARCH EXPERIENCE

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2022–present **Postdoctoral Scholar**, Department of Genetics, Stanford University

- Advisor: Prof. Alice Ting
- Harnessing protein engineering, directed evolution, and computation-guided protein design to develop a variety of molecular biology tools including:
  - Synthetic GPCRs for customized cell sensing, behaviors, and recording

- Proximity labeling enzymes whose activity can be controlled by a biomolecule of interest
- Disulfide-free nanobodies optimized for intracellular applications
- Light-activated epitope tags whose interaction with nanobody can be controlled by blue light

2016–2022 **PhD Candidate**, Department of Chemistry and Chemical Biology, Cornell University

- *Advisor: Prof. Jeremy Baskin*
- Focused on understanding lipid signaling by the development of molecular biology tools including:
  - Light-activable phospholipase D enzymes whose localization and activity can be controlled by light
  - Photoswitchable phosphatidic acid analogs whose bioactivity can be switched by light
  - Directly evolved membrane editor (based on phospholipase D) for in situ editing of membrane lipids

Apr–Jul 2016 **Research Assistant**, Emergent Soft Matter Function Research Group, RIKEN, Japan

- *Advisor: Dr. Daigo Miyajima*
- Synthesized superparamagnetic iron oxide nanoparticles coated with zwitterionic ligands to enhance MRI resolution, and characterized their structural and surface properties using atomic force microscopy (AFM) and transmission electron microscopy (TEM)

2015–2016 **Undergraduate Researcher**, Department of Chemistry and Biotechnology, University of Tokyo

- *Advisor: Prof. Takuzo Aida*
- Conducted an independent undergraduate dissertation project focused on the design and synthesis of organic ligand molecules for functionalizing gold nanoparticles, aimed at therapeutic applications

Feb–Mar 2015 **Visiting Student**, Department of Bioengineering, University of California, Berkeley

- *Advisor: Prof. Seung-Wuk Lee*
- Gained experience with AFM and assisted Lee Lab members with sample preparation and data acquisition

## RESEACH PUBLICATIONS

\*: equal contribution

11. Kalogriopoulos NA\*, **Tei R\***, Yan Y, Klein PM, Ravalin M, Cai B, Soltesz I, Li Y, and Ting AY. “Programmable synthetic GPCRs for customized antigen-dependent control of cell behavior.” *Nature* (2024) in press. <https://www.nature.com/articles/s41586-024-08282-3>
10. **Tei R** and Baskin JM. “Dynamic network regulating phosphatidic acid homeostasis revealed using membrane editing coupled to proximity labeling.” *bioRxiv* (2024). <https://doi.org/10.1101/2024.09.14.612979>
9. Luan L, Liang D, Chiu DC, **Tei R**, and Baskin JM. “Imaging interorganelle phospholipid transport by extended synaptotagmins using bioorthogonally tagged lipids.” *ACS Chemical Biology* (2024) 19, 8, 1683–1694. <https://doi.org/10.1021/acscchembio.4c00345>
8. Li X, **Tei R**, Uematsu M, and Baskin JM. “An ultralow background, photoswitchable membrane editor for subcellular level manipulation of lipid signaling.” *ACS Central Science* (2024) 10, 3, 543–554. <https://doi.org/10.1021/acscentsci.3c01105>
7. **Tei R**, Bagde SR, Fromme JC, and Baskin JM. “Activity-based directed evolution of a membrane editor in mammalian cells.” *Nature Chemistry* (2023) 15, 1030–1039. <https://doi.org/10.1038/s41557-023-01214-0>
6. Su YA, Chiu HY, Chang YC, Sung CJ, Chen CW, **Tei R**, Huang XR, Hsu SC, Lin SS, Wang HC, Lin YC, Hsu JC, Bauer H, Feng Y, Baskin JM, Chang ZF, Liu YW. “NME3 binds to phosphatidic acid and mediates PLD6-induced mitochondrial tethering.” *Journal of Cell Biology* (2023) 222, 10, e202301091. <https://doi.org/10.1083/jcb.202301091>
5. **Tei R\***, Morstein J\*, Shemet A, Trauner D<sup>#</sup>, and Baskin JM<sup>#</sup>. “Optical control of phosphatidic acid signaling.” *ACS Central Science* (2021) 7, 7, 1205–1215. <https://doi.org/10.1021/acscentsci.1c00444>

4. Bumpus TW, Huang S, **Tei R**, and Baskin JM. “Click chemistry-enabled CRISPR screening reveals GSK3 as a regulator of PLD signaling.” *Proceedings of the National Academy of Sciences* (2021) 118, 48, e2025265118. <https://doi.org/10.1073/pnas.2025265118>
3. **Tei R** and Baskin JM. “Spatiotemporal control of phosphatidic acid signaling with optogenetic, engineered phospholipase Ds.” *Journal of Cell Biology* (2020) 219, 3, e201907013. <https://doi.org/10.1083/jcb.201907013>
2. Jorgensen J, **Tei R**, Baskin JM, Michel A, Kornmann B, and Emr S. “ESCRT-III and ER-PM contacts maintain lipid homeostasis.” *Molecular Biology of the Cell* (2020) 31, 12, 1302–13. <https://doi.org/10.1091/mbc.E20-01-0061>
1. Liang D, Wu K\*, **Tei R\***, Bumpus TW, Ye J, and Baskin JM. “A real-time, click chemistry imaging approach reveals stimulus-specific subcellular locations of phospholipase D activity.” *Proceedings of the National Academy of Sciences* (2019) 116, 31, 15453–62. <https://doi.org/10.1073/pnas.1903949116>

## REVIEW ARTICLES

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3. **Tei R**. “The dynamic regulatory network of phosphatidic acid metabolism: a spotlight on substrate cycling between phosphatidic acid and diacylglycerol.” *Biochemical Society Transactions* (2024) BST20231511. <https://doi.org/10.1042/BST20231511>
2. **Tei R** and Baskin JM. “Click chemistry and optogenetic approaches to visualize and manipulate phosphatidic acid signaling.” *Journal of Biological Chemistry* (2022) 298, 4, 101810. ASBMB Award Article. <https://doi.org/10.1016/j.jbc.2022.101810>
1. **Tei R** and Baskin JM. “Induced proximity tools for precise manipulation of lipid signaling.” *Current Opinion in Chemical Biology* (2021) 65, 93–100. <https://doi.org/10.1016/j.cbpa.2021.06.005>

## PATENTS

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2. Kalogriopoulos NA, Ting AY, **Tei R**, and Ravalin MA. “Methods and Compositions in Programmable Receptor for Antigen-Detection and Customized Cell Responses.” *U.S. Patent application filed on July 29, 2024.*
1. Baskin JM and **Tei R**. “Engineered Phospholipase D Mutants, Methods of Making Engineered Phospholipase D Mutants, and Uses Thereof.” *U.S. Patent application filed on Dec 6, 2022.*

## FUNDING AND FELLOWSHIPS

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- 2023–present **Life Sciences Research Foundation Fellowship**, sponsored by Astellas Pharmaceuticals
- Funded Project: A programmable synthetic GPCR platform for customized antigen sensing and cell responses
  - Award Amount: \$66,000/year for stipend and \$11,000/year as a research allowance for 3 years
- (2023–2025) **JSPS Overseas Research Fellowship**, Japan Society for the Promotion of Science
- Funded Project: An engineered synthetic circuit for recording cell-cell proximity in the RNA of living cells
  - Award Amount: \$50,000/year for 2 years (early termination in 2023 due to the activation of LSRF fellowship)
- 2022–present **Funai Overseas Postdoctoral Grant**, Funai Foundation for Information Technology
- Award Amount: \$10,000/year for up to 3 years
- 2020–2022 **Honjo International Scholarship**, Honjo International Scholarship Foundation
- Graduate program fellowship awarded to Japanese students pursuing studies abroad
  - Award Amount: \$24,000/year for 2.25 years

2018–2020 **Funai Overseas Scholarship**, Funai Foundation for Information Technology

- Graduate program fellowship awarded to Japanese students pursuing studies abroad
- Award Amount: \$30,000/year for 2 years

2017–2018 **Cornell Graduate Fellowship**, Cornell University

- Graduate program fellowship awarded to a selected group of incoming Cornell Graduate students
- Award Amount: \$ 38,088/year for 1 year

## **CONTRIBUTION TO FUNDED RESEARCH**

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2023–present **NIGMS 5R01GM151682-02** PI: Jeremy Baskin

- Funded Project: Deciphering phosphatidic acid homeostasis and signaling using optogenetic membrane editors
- Role: Assisted in outlining the research objectives, providing preliminary data, and reviewing the proposal

## **INVITED TALKS AND CONFERENCE PRESENTATIONS**

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- Aug. 2024 “Synthetic receptors for precise manipulation of defined synaptic connections.” Selected talk at *DBC Young Investigator Award* session, ACS Fall 2024, Denver, CO.
- Aug. 2024 “Synthetic G protein-coupled receptors for programmable sensing and control of cell behavior.” Invited talk at Weill Institute for Cell and Molecular Biology Retreat, Geneva, NY.
- Jun. 2024 “A generalizable design strategy for antigen-gated receptors and enzymes.” Selected talk at 2024 Leading Edge Symposium, HHMI | Janelia, Ashburn, VA.
- Dec. 2023 “Membrane editing and proximity labeling reveals a dynamic network regulating phosphatidic acid metabolism.” Invited talk at *Lipids in Organelle Form, Function, and Communication* Subgroup session, Cell Bio 2023 Meeting, ASCB | EMBO, Boston, MA.
- Feb. 2023 “Optogenetic modulation of cellular lipids by membrane editor.” Invited talk at 90<sup>th</sup> IRCMS Seminar-Symposium on New Horizons in Developmental Biology, the International Research Center for Medical Sciences at Kumamoto University, Japan.
- May 2022 “Enzyme engineering and optogenetics to dissect phosphatidic acid signaling.” Invited talk at 2022 Graduate Student Award Symposium, the Department of Chemistry and Chemical Biology at Cornell University, Ithaca, NY.
- Dec. 2021 “Optogenetic modification of membrane lipids using engineered Phospholipase Ds” Selected talk at *Cellular Organization of Metabolism* Mini-symposium session, Cell Bio Virtual 2021 Meeting, ASCB | EMBO, Virtual.
- May 2021 “Optogenetic, engineered phospholipase Ds for spatiotemporal control of phosphatidic acid signaling.” Selected talk at Janelia Junior Scientist Workshop: Early Career Researcher Symposium on Protein Engineering, HHMI | Janelia, Zoom.
- Apr. 2020 “Spatiotemporal control of phosphatidic acid signaling with optogenetic, engineered phospholipase Ds.” Invited talk at ASBMB Zoom Lipid Seminar Series, ASBMB, Zoom.
- Aug. 2019 “An optogenetic phospholipase D for spatiotemporal control of phosphatidic acid signaling.” Selected talk at Janelia Junior Scientist Workshop on Solving Biological Problems with Chemistry, HHMI | Janelia, Ashburn, VA.
- Jul. 2019 “An optogenetic phospholipase D for spatiotemporal control of phosphatidic acid signaling.” Selected talk at Molecular Membrane Biology Gordon Research Seminar, Andover, NH.
- Mar. 2016 “Development of adhesive nanoparticles for clinical application.” Oral presentation at the 96th Chemical Society of Japan (CSJ) Annual Meeting, Kyoto, Japan.

## LEADERSHIP AND OUTREACHING ACTIVITIES

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Philosophy: I am committed to creating spaces where everyone feels welcomed and valued. I believe that building an inclusive environment requires continuous, collective effort at the community level, and addressing oppressive dynamics is essential for advancing both science and education. Oppressive atmospheres harm not only those targeted but everyone involved, as they would stifle scientific curiosity and open-minded discussion. To foster a healthy, inclusive environment, it is crucial to encourage interaction and dialogue among diverse individuals with shared positive intentions. I have been dedicated to sharing my experiences and insights in science, academic pathways, and career development, driving positive change across various communities, including my local, ethnic, and social groups.

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### 2024–present **Sub-Team Leader, Interdepartmental Coalition for Lab Sustainability at Stanford (ICLSS)**

- Co-leading the ICLSS Non-Hazardous Waste Sub-Team, focusing on addressing the challenges surrounding the sorting, recycling, and reuse of non-hazardous materials in Stanford labs
- Launched a pilot program that enhances recycling efforts and raise awareness about sustainable waste management practices, all with the goal of reducing lab generated waste and empowering researchers to feel pride in contributing to environmental sustainability

### Jul. 2024 **Event Host and Lecturer, Campus Visit by Osaka Global Leaders Program**

- Led a campus tour and delivered an hour-long lecture to 30 Japanese high school students, focusing on leadership development and the importance of fostering diversity, equity, and inclusion

### Jul. 2024 **Panelist and Presenter, Japan-US Research Collaboration Week 2024**

- Presented in a panel discussion for creating core research community and fostering talent mobility with the goal of promoting international collaboration

### Mar. 2024 **Event Host and Lecturer, Campus Visit by Mukogawa Women's University High School**

- Hosted a campus tour followed by an hour-long lecture to a group of 30 female Japanese high school students, promoting inclusion and opportunities for women in the STEM field

### 2024 **Selected Member, Certificate of Critical Consciousness & Anti-Oppression Praxis Program**

- A year-long cohort program consisting of workshops, journal clubs, and a unique praxis project designed by each participant, to learn and practice anti-oppression, empathy, and justice
- Designed a praxis project “Stanford Lab Plastic Waste Reduction Project ([SLaPWaRP](#))” by working with Sustainable Stanford communities to reduce plastic waste generated in molecular biology labs

### 2023 **Co-Leader, Community College Outreach Program Science Small Groups (SSG)**

- Zoom-based group mentorship program to help community college students learn how to conduct scientific research by guiding them on their ways to formulate and explore their curiosity questions
- As a co-leader, designed [posters](#) and led a career development workshop “How to Build Your Resume”
- Received a focused mentorship training by attending a half-day workshop: *Culturally Inclusive Mentoring Workshop for Optimizing Cultural Awareness and Responsiveness in Research Mentoring Relationships*

### Nov. 2023 **Panelist and Presenter, 2023 Kurume Fusetsu High School Tokyo Branch General Meeting**

- Delivered a short presentation, followed by an interview discussion, advocating for a career as a scientist to over 200 Kurume Fusetsu High School alumni, ranging across 50 graduating classes

### 2017–2022 **Workshop Leader, Expanding Your Horizons (EYH) Workshop, Cornell University**

- An annual outreach program for middle school girls to increase inclusiveness in STEM fields
- Worked with other Baskin Lab members to hold lectures and hands-on workshops about lipids

### 2019–2020 **Organizer, Study Abroad Seminar, [YouTube Live](#) (2020) and Tokyo, Japan (2019)**

- Delivered interactive seminars to support Japanese undergraduates interested in studying abroad
- Invited presenters from diverse backgrounds to promote diversity and inclusion in the early career scientists

## TEACHING AND MENTORSHIP

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2023–present **Research Mentor, Laboratory of Alice Ting**, Stanford University

- Supervising a Stanford University graduate rotation student, Sophia Chen (Sep. 2024–present)
- Supervised a Stanford University graduate rotation student, Corey Model (Apr–June 2024)
- Supervised a Stanford University graduate rotation student, Chris Matthews (Sep–Dec. 2023)

Oct. 2024 **Guest Lecturer, GENE 246 (Instructors: Kyle Daniels and Alice Ting)**, Stanford University

- Delivered a guest lecture on practical approaches to yeast display directed evolution

2023 **Small Group Mentor, Community College Outreach Program Science Small Groups (SSG)**

- Mentored community college students, Hamzeh Dakelbab and Tanner Ngo (Sep–Dec. 2023)
- Mentored community college students, Daena Dublin, Shasha Han, and Tahir Mahmood (Feb–May 2023)

2017–2022 **Research Mentor, Laboratory of Jeremy Baskin**, Cornell University

- Supervised a Cornell University graduate student, Xiang-Ling (Julia) Li (Sep. 2021–Aug. 2022)
- Supervised a Cornell University undergraduate student, Paris Ghazi (Aug. 2018–Aug. 2019)
- Supervised a Cornell University undergraduate student, Jonathan Lee (Sep. 2017–May 2018)

2016–2017 **Graduate Teaching Assistant, CHEM2510 (Instructor: Tom Rutledge)**, Cornell University

- Supervised two organic chemistry lab sections of 20 students and evaluated their performance

## PEER REVIEW SERVICE

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- Invited reviewer for *ACS Chemical Biology* (2024)
- Invited reviewer for *Review Commons* (2024)
- Invited reviewer for *European Journal of Organic Chemistry* (2023)

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

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- American Society of Cell Biology (2023–present)
- American Chemical Society (2024–present)

## WORK AUTHORIZATION

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- U.S. Permanent Resident (Green Card Holder)