Prof. Ho Fung (Edmund) Cheng

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EMPLOYMENT

Assistant Professor of Chemistry, Point Loma Nazarene University, San Diego, CA ***Aug 2025–***

Assistant Professor of Organic Chemistry, Pepperdine University, Malibu, CA ***Aug 2024– July 2025***

Postdoctoral Associate, Massachusetts Institute of Technology, Cambridge, MA ***2022–2024***
Advisor: Prof. Jeremiah A. Johnson

EDUCATION

Northwestern University, Evanston, IL
Ph.D. in Chemistry ***March 2022***
Dissertation title: Dynamic and Switchable Chemical Assemblies with Molecular Precision
Committee: Prof. Chad A. Mirkin (advisor and chair), Prof. Nathan C. Gianneschi, Prof. Omar K. Farha

University of Oxford, Christ Church College, UK
Master of Chemistry (First Class Honors) ***July 2016***
Honor thesis title: Semi-synthesis of site-mutated transmembrane protein pore
Advisor: Prof. Hagan Bayley

RESEARCH

INDEPENDENT RESEARCH *2024–*

My research develops methods to make DNA/RNA-like polymers, with a focus on controlling nucleobase sequence and tuning backbone degradability.

MENTORED RESEARCH

Postdoctoral associate, Johnson group, Massachusetts Institute of Technology ***2022–2024***
- Encasing DNA in deconstructable glassy thermoset for archival storage.
- Synthesizing sugar-functionalized, discrete oligomers for lectin targeting.

Graduate research assistant, Mirkin group, Northwestern University ***2016–2021***
- Developed supramolecular DNA dendrimers as switchable nanoscale building block.
- Pioneered using molecule-DNA hybrids as "electron-equivalents" for nanoparticle assembly.
- Studied the hemilabile coordination of Pt^{II} complexes in a biphasic system.
- Developed a redox-switchable Pt^{II} complex with reversible control over single coordination site.

Undergraduate researcher, Bayley group, University of Oxford ***2015–2016***
- Synthesized α-hemolysin protein channels with unnatural amino acid as tracks for "molecular walkers".

Undergraduate researcher, Davis group, University of Oxford ***Summer 2014***
- Developed label-free quantification for autoantibodies in serum via electrical impedance spectroscopy.

TEACHING

INDEPENDENT TEACHING

Primary Instructor, CHE 1003 Introduction to General, Organic, and Biological Chemistry, Point Loma Nazarene University ***Fall 2025***

- One 40-student and one 43-student session in Fall 2025.

Primary Instructor, CHE 2094L Organic I Laboratory, Point Loma Nazarene University ***Fall 2025***

- One 13-student session in Fall 2025.

Primary Instructor, CHEM 311 Organic Chemistry II, Pepperdine University ***Spring 2025***

- One 37-student session.

Primary Instructor, CHEM 310 Organic Chemistry I, Pepperdine University ***Spring 2025, Fall 2024***

- One 40-student session and one 37-student session in Fall 2024, One 11-student session in Spring 2025.

Primary Instructor, Chem 311L Organic Chemistry II Laboratory, Pepperdine University ***Spring 2025***

- One 16-student session and one 14-student session.

Primary Instructor, Chem 311P Organic Chemistry Prelab Lecture, Pepperdine University ***Spring 2025***

- One 37-student session.

Primary Instructor, Chem 310L Organic Chemistry I Laboratory, Pepperdine University ***Fall 2024***

- One 14-student session.

PEDAGOGICAL TRAINING

The Kaufman Teaching Certificate Program (KTCP), MIT ***Fall 2023***

- Developed evidence-based teaching techniques through eight practice-based workshops.
- Topics include course design, assessment, active learning, syllabus construction, etc.

MENTORSHIP

IN LABORATORY SETTING

As their mentor, I provided guidance on various aspects of their research (e.g., project ideation, experiment design, and data analysis), training in synthetic skills (e.g., air-free synthesis) and characterization techniques (e.g., NMR, MS, and GPC), and critical feedback on their scholarly work (e.g., thesis, manuscript, and poster presentations).

Undergraduate Students

- Ashleigh Meltz (2025- , Point Loma Nazarene University)
- Beca Silva (2025- , Point Loma Nazarene University)
- Brody Bangert (2025- , Point Loma Nazarene University)
- Eljiah Flodstrom (2025- , Point Loma Nazarene University)
- Bridget Swanson (2024–2025, Pepperdine University)
- Chris Ghim (2024–2025, Pepperdine University)

- Isaiah Chung (2024–2025, Pepperdine University)
- Rakel Ang (2024–2025, Pepperdine University; current: PhD student at UC Irvine)
- Vera Syers (2024–2025, Pepperdine University)
- Taylor Talley (Summer 2022, Chemical Bonding Fellow, Spelman College/MIT; current: postbacc researcher at NIH)
- McKinley Paul (2018–2020, Northwestern University; current: PhD candidate at Georgia Institute of Technology)

Graduate Students

- Dr. Max Distler (2019–2021, Northwestern University; current: Associate at Flagship Pioneering)
- Dr. Benjamin Coleman (2020–2021, Northwestern University; current: Senior Scientist at Abbott)

OUTSIDE LABORATORY

I also mentored the following undergraduate and graduate students in their first year of their studies, as part of Northwestern's Diversity Peer Mentor program and MIT's Mentoring Advocate Partnership program.

- Ignacio Guzman (2023–2024, MIT)
- Sebnem Ture (2021–2022, Northwestern University)
- Max Ng (2020–2021, Northwestern University)

PUBLICATIONS

Undergraduate or graduate mentee coauthors are underlined. ‡Denotes equal contribution.

14) Li, Y.; Zhou, W.; Zhou, Y.; **Cheng, H. F.**; Lee, B.; Hu, X.; Roth, E. W.; Dravid, V. P.; Glotzer, S. C.; Mirkin, C. A. "Cocrystals combining order and correlated disorder via colloidal crystal engineering with DNA", *Sci. Adv.* **2025**, *11,* eadu4919.

13) Prince, E.‡; **Cheng, H. F.**‡; Banal, J. L.; Johnson, J. A. "Reversible nucleic acid storage in deconstructable glassy polymer networks", *J. Am. Chem. Soc.* **2024**, *146,* 17066–17074.
‡***Equal first-author contribution***

12) **Cheng, H. F.**; Johnson, J. A. "Controlling the orientation of hole transport molecules in bottlebrush polymers for enhanced OLED performance (Research Highlight)", *Aggregate* **2022**, 00, e259.

11) Wang, S.‡; Lee, S.‡; Du, J. S.‡; Partridge, B. E.; **Cheng, H. F.**; Zhou, W.; Dravid, V. P.; Lee, B.; Glotzer, S. C.; Mirkin C. A. "The emergence of valency in colloidal crystals through electron equivalents", *Nat. Mat.* **2022**, *21*, 580–587.

10) **Cheng, H. F.**‡; Distler, M. E.‡; Lee, B.; Zhou, W.; Weigand, S.; Mirkin C. A. "Nanoparticle Superlattices Through Template-Encoded DNA Dendrimers", *J. Am. Chem. Soc.* **2021**, *143,* 17170–17179.
‡***Equal first-author contribution. Graduate mentee coauthor underlined.***

9) Gu, Y.; Distler, M. E.; **Cheng, H. F.**; Huang, C.; Mirkin C. A. "A General DNA-Gated Hydrogel Strategy for Selective Transport of Chemical and Biological Cargos", *J. Am. Chem. Soc.* **2021**, *143,* 17200–17208.

8) Ebrahimi, S. B.;‡ Samanta, D.‡; Partridge, B. E.; Kusmierz, C. D.; **Cheng, H. F.**; Grigorescu, A. A.; Chávez, J. L.; Mirau, P. A.; Mirkin, C. A. "Programming Fluorogenic DNA Probes for Rapid Detection of Steroids", *Angew. Chemie., Int. Ed.* **2021**, 60, 15260–15265.

7) **Cheng, H. F.**‡; Paul, M.‡; d'Aquino, A. I.; Stern, C. L.; Mirkin C. A. "Multi-State Dynamic Coordination Complexes Interconverted through Counterion-Controlled Phase Transfer", *Inorg. Chem.* **2021**, 60, 4755–4763.
‡***Equal first-author contribution. Undergraduate mentee coauthor underlined.***

6) **Cheng, H. F.**‡; Wang, S.‡; Mirkin C. A. "Electron-Equivalent Valency through Molecularly Well-Defined Multivalent DNA", *J. Am. Chem. Soc.* **2021***,* 143, 1752–1757.
‡***Equal first-author contribution***

5) Samanta, D.‡; Ebrahimi, S. B.‡; Kusmierz, C. D.; **Cheng, H. F.**; Mirkin, C. A. "Protein Spherical Nucleic Acids for Live-Cell Chemical Analysis", *J. Am. Chem. Soc.* **2020**, 142, 13350–13355.

4) Ebrahimi, S. B.‡; Samanta, D.‡; **Cheng, H. F.**; Nathan, L. I.; Mirkin, C. A. "Forced Intercalation (FIT)-Aptamers", *J. Am. Chem. Soc.* **2019**, 141, 13744–13748.

3) **Cheng, H. F.**; d'Aquino, A. I.; Barroso-Flores, J.; Mirkin, C. A. "A Redox-Switchable, Allosteric Coordination Complex", *J. Am. Chem. Soc.* **2018**, 140, 14590–14594.

2) d'Aquino, A. I.; **Cheng, H. F.**; Barroso-Flores, J.; Kean, Z. S.; Mendez-Arroyo, J.; McGuirk, C. M.; Mirkin, C. A. "An Allosterically-Regulated, Four-State Macrocycle", *Inorg. Chem.* **2017**, 57, 3568–3578.

1) Xu, Q.; **Cheng, H.**; Lehr, J.; Patil, A. V.; Davis, J. J. "Graphene Oxide Interfaces in Serum Based Autoantibody Quantification", *Anal. Chem.* **2015**, 87, 346–350.

PATENTS & PROVISIONAL APPLICATIONS

3) Prince, E.; **Cheng, H. F.**; Banal, J. L.; Johnson, J. A. "Storage and Release of Biomolecules", patent pending 63/447,843, provisional patent application filed.

2) Mirkin, C. A.; Distler, M. E.; **Cheng, H. F.**; Gibson, K. J. "Oligonucleotide Dendrimers for Dynamic and Functional Colloidal Crystal Engineering", *US 20250043081 A1*.

1) Mirkin, C. A.; Ebrahimi, S. B.; Samanta, D.; **Cheng, H. F.** "Forced intercalation (fit)-aptamers: probes based on forced intercalation", *US 20220348985 A1*.

TALKS & POSTERS

8) Developing nucleoside-based bicyclic monomers for the synthesis of triplex-forming polymers. *ACS Spring 2025* (**poster**; March 17, 2025). Rakel Ang (primary presenter), Chris Ghim, Vera Syers, Ho Fung Cheng (mentor).

7) Synthesizing Bicyclic Nucleosides for Ring-Opening Polymerization. *Southern California Conference for Undergraduate Research 2024* (**poster**; November 23, 2024). Vera Syers (primary presenter), Chris Ghim, Rakel Ang, Ho Fung Cheng (mentor).

6) Surfactant Chemistry Enhances Curing Control in Polymer Colloids. *Southern California Conference for Undergraduate Research 2024* (**poster**; November 23, 2024). Isaiah Chung (primary presenter), Bridget Swansen, Ho Fung Cheng (mentor).

5) Storing and Preserving DNA in Deconstructable Glassy Polymer Networks. *MIT Polymer Day* (**poster**; May 1, 2024).

4) The Storage and Release of DNA using Deconstructable, Hydrophobic Thermoset. *Polymers Gordon Research Seminar* (**invited for talk and poster**; June 4, 2023) and *GRC* (**poster**).

3) Nanoparticle Superlattices Through Template-Encoded DNA Dendrimers. *Just Another (Chemistry) Webinar Series* (**invited for talk**; November 2, 2021).

2) Colloidal Crystal Engineering Using Electron Equivalents with Defined Valency. *American Chemical Society (ACS) National Meeting* (**invited for talk**; April 13, 2021).

1) Allosteric Redox Regulation of Metal Coordination and Catalytic Activity**.** *Self-Assembly and Supramolecular Chemistry Gordon Research Seminar* (**invited for talk and poster**; May 19, 2019) and *GRC* (**poster**).

AWARDS, FELLOWSHIPS & FUNDING

Summer Undergraduate Research Program Award, Pepperdine University	*Summer 2025*
Academic Year Undergraduate Research Initiative, Pepperdine University	*Spring 2025, Fall 2024*
Faculty/Student Mentor Program, Pepperdine University	*Spring 2025, Fall 2024*
2024 Mentor Advocate Partnership Rookie of the Year, MIT	*2024*
2024 Infinite Expansion Award, MIT School of Science	*2024*
International Institute for Nanotechnology (IIN) Outstanding Researcher Award	*2021*
IPMI Outstanding Student Recognition, International Precious Metals Institute	*2021*
Ryan Fellowship, Northwestern University	*2019–2021*
First Class Honors in Chemistry, University of Oxford	*2016*
Scholar, Christ Church College, University of Oxford	*2013–2016*

LEADERSHIP AND SERVICE

Peer reviewer	*Ongoing*
Mentor Advocate Partnership, Office of Minority Education, MIT	*2023–2024*
Environment Health Safety Representative, Johnson group	*2022–2024*
The Graduate School Diversity Peer Mentor, Northwestern University	*2020–2022*
STEM panelist, Mentorship Opportunities for Research Engagement, Northwestern University	*2020–2021*
Graduate Liaison Committee, Department of Chemistry, Northwestern University	*2019–2021*
Organometallic subgroup leader, Mirkin group	*2018–2021*
Science outreach and teaching, Science in the Classroom and Junior Science Club	*2017–2021*