

Shih-Ting (Christine) Wang, Ph.D.

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EDUCATION

- 2013-2017 **Ph.D.**
Imperial College London | Materials Science
London, United Kingdom
- 2012-2013 **M.S.**
National Cheng Kung University | Materials Science and Engineering
Tainan, Taiwan
- 2009-2012 **B.S., *Summa Cum Laude* (GPA 3.99/4.0)**
National Cheng Kung University | Materials Science and Engineering
Tainan, Taiwan

EMPLOYMENT

- Jan 2025 **Assistant Professor**
Northwestern University | Materials Science and Engineering
Evanston, IL
- Jan 2025 **Assistant Professor (secondary appointment)**
Northwestern University | Division of Pulmonary and Critical Care, Department of
Medicine, Chicago, IL
- 2021-
present **Postdoctoral Associate, Ludwig Fellow**
Massachusetts Institute of Technology | Koch Institute
Cambridge, MA
Advisor: Sangeeta Bhatia, M.D., Ph.D.
- Research area: Synthetic biomarkers for profiling and early detection of lung cancer and pulmonary infection.
 - Main project: Develop non-invasive multiplexed breath biopsy for detection and monitoring of lung diseases.
 - Leadership: Lead design of multiplexed nano-sensors for non-small cell lung cancer and pediatric lung infection in industrial collaborations and grants.
- 2017-2021 **Research Associate**
Brookhaven National Laboratory | Center for Functional Nanomaterials
Upton, NY
Advisor: Oleg Gang, Ph.D.
- Research area: Designed programmable DNA platforms for protein lattice engineering, nanomedicine, and nanomaterial digitalization.

ACADEMIC RESEARCH EXPERIENCE

- 2019-2020 **Visiting Researcher**
Stanford University | Chemistry
Stanford, CA
Mentor: Carolyn Bertozzi, Ph.D.
- Engineered antibody-DNA hybrid structure targeting breast cancer (*PNAS*, 2020).
- 2016-2020 **Visiting Researcher**

Lawrence Berkeley National Laboratory | Molecular Foundry

Berkeley, CA

Mentors: Shaul Aloni, Ph.D., Peter Ercius, Ph.D., Ronald Zuckermann, Ph.D.

- (Cryo)electron microscopy analysis of protein-DNA lattice (*Nat. Commun.* 2021).
- Designed peptoids for stabilization of DNA origami in bio-fluids (*PNAS*, 2020).
- *In-situ* liquid-cell electron microscopy analysis of anisotropic nanoparticle growth (*Nanoscale*, 2019).
- Identified sequence determinants in diabetes-related amyloid (*ACS Nano*, 2017).

2013-2017 **Graduate Student Researcher**

Imperial College London | Materials

Advisor: Molly Stevens, Ph.D.

Thesis: Investigation of type 2 diabetes related biosensing and amyloid fibrillation.

2012-2013 **Graduate Student Researcher**

National Cheng Kung University | Materials Science and Engineering

Advisor: Chuan-Pu Liu, Ph.D.

Dissertation: Photoluminescence of nanoparticle decorated graphene oxide.

2010-2012 **Undergraduate Student Researcher**

National Cheng Kung University | Materials Science and Engineering

Advisor: Jen-Sue Chen, Ph.D.

- *Independent research: Sol-gel mechanism of semiconducting ZnO thin films.*
- Research awarded by the Taiwan Ministry of Science and Technology.

HONORS/AWARDS

- 2023 **MIT Ludwig Center/Koch Institute postdoctoral fellowship:** awarded proposal title "Engineering Orthogonal Breath Biomarkers for Multiplexed Cancer Diagnostics.
- 2021 **Staff highlight:** "*Shih-Ting (Christine) Wang: Designing Materials for Biomedicine*", Brookhaven National Laboratory
- 2019 **Technology transfer award:** Semi-finalist of pitch development on "*Structure-Controlled Targeted Drug Delivery*", Brookhaven National Laboratory, awarded \$15,000.
- 2016 **iSense mobility fellowship:** awarded by the Engineering and Physical Sciences Research Council (EPSRC), United Kingdom, to study bio-nano interactions of nano-sensors for infectious disease using liquid cell electron microscopy study at Lawrence Berkeley National Laboratory.
- 2013 **Taiwan Top University Strategic Alliance PhD scholarship:** awarded full scholarship by the Taiwan Ministry of Education to complete a Ph.D. study.
- 2012 **Taiwan Semiconductor Manufacturing Company graduate fellowship:** awarded for the development of III-V semiconductor nanowire gas sensor.
- 2012 **Taiwan Rotary Foundation graduate fellowship:** awarded for the study of optical properties of nanoparticle-decorated graphene oxide.

PROFESSIONAL ACTIVITIES/SERVICES

Memberships in Scientific, Professional and Scholarly Organizations

Materials Research Society

2016 – present

Biomedical Engineering Society	2020 – present
American Institute for Chemical Engineers	2020 – present
Royal Society of Chemistry	2016-2018

Ad Hoc Reviewer

- Journals: *Frontiers in Chemistry*, *RSC Advances*, and *Nano Letters*.
- User proposals of the Center for Functional Nanomaterials, Brookhaven National Laboratory: soft materials and electron microscopy focus, reviewed 23 proposals since 2021.

TEACHING AND MENTORING EXPERIENCES

Teaching

- 2022 **Mentor of The Junior Academy of The New York Academy of Sciences:** Selected mentor to middle school and high school students in the STEM field participated in the NYAS Challenges. Meet with students 1–2 hours per week, answering questions and providing input on the student projects.
- 2014-2015 **Teaching assistant of undergraduate laboratories, Imperial College London:** TA two terms on “Fourier transformed infrared spectroscopy of polymers” and “Tensile testing of metals”, demonstrated lab to 120 students, led discussion and graded reports.
- 2014 **Instructor of St. Paul School-Imperial College outreach:** Supervised a team of 6 high school students to design and perform experiments in a 4-week lab experience.
- 2012-2013 **Teaching assistant of graduate-level course, National Cheng Kung University:** TA one semester on “Advanced Materials Characterization”, assisted course materials, led discussion, and graded reports.

Mentored students

- 2023-present Claire Zheng, undergraduate student, Massachusetts Institute of Technology: mentored project on classification substrates and profiling of protease specificity.
- 2022-present Daniel Kim, graduate student, Massachusetts Institute of Technology: mentored and collaborated project on breath biopsies for early detection of lung cancer.
- 2021-present Cathy Wang, graduate student, Massachusetts Institute of Technology: mentored and collaborated project on DNA barcoding for profiling lung cancer.
- 2021 Eric Shen, graduate student, Columbia University: mentored project on the design of protein-DNA lattices.
- 2018-2021 Yan Xiong, graduate student, Columbia University: mentored projects on DNA designs for nanomaterials display and enzyme lattices.
- 2018 Lev Bershadsky, undergraduate summer student, Harvard University: mentored project on the design of protein-DNA lattices and electron microscopy imaging.

PUBLICATIONS

Peer-reviewed publications (17 total, 8 first-authored papers), †equal contribution

2024

1.C. Martin-Alonso[†], S. Tabrizi[†], K. Xiong[†], T. Blewett, S. Sridhar, A. Crnjac, S. Patel, Z. An, A. Bekdemir, D. Shea, **S. -T. Wang**, S. Rodriguez-Aponte, C. A. Naranjo, J. Rhoades, J. Kirkpatrick, H. Fleming, A. Amini, T. R. Golub, J. C. Love, S. N. Bhatia, V. A. Adalsteinsson. Priming agents improve *in vivo* recovery of cell-free DNA and enhance the sensitivity of liquid biopsies. *Science* 383, 6680.

2023

2.C. Chen, Y. Wu, **S. -T. Wang**, N. Berisha, M. Manzari, K. Vogt, O. Gang, D. A. Heller. Fragment-Based Drug Nanoaggregation Reveals Drivers of Self-Assembly. *Nat. Commun.* 14, 8340.

2022

3. **S. -T. Wang**[†], H. Zhang[†], S. Xuan, D. Nykypanchuk, Y. Zhang, G. Freychet, B. Ocko, R. N. Zuckermann, N. Todorova, O. Gang. Compact Peptoid Molecular Brushes for Nanoparticle Stabilization. *J. Am. Chem. Soc.*, 44, 18, 8138–8152. ***JACS cover, volume 144, issue 18.**

4. A. Artzy-Schnirman, E. Abu-Shah, R. Chandrawati, E. Altman, N. Yusuf, **S. -T. Wang**, J. Ramos, K. Hansel, M. Haus-Cohen, R. Dahan, S. Arif, M. Dustin, M. Peakman, Y. Reiter, M. M. Stevens. Artificial Antigen Presenting Cells for Detection and Desensitisation of Auto-reactive T cells Associated with Type 1 Diabetes. *Nano Lett.*, 22, 11, 4376–4382.

2021

5. **S. -T. Wang**, B. Minevich, J. Liu, H. Zhang, D. Nykypanchuk, W. Liu, J. Byrnes, L. Bershady, Q. Liu, T. Wang, G. Ren, O. Gang. Designed and Biologically Active Protein Lattices. *Nat. Commun.*, 12: 3702. **BNL highlight:** <https://www.bnl.gov/newsroom/news.php?a=118901>

6. Y. Lin, M. Penna, C. D. Spicer, S. Higgins, A. Gelmi, N. Kim, **S. -T. Wang**, E. T. Pashuck, I. Yarovsky, M. M. Stevens. High Throughput Peptide Evolution towards (Supra)molecular Diversification in Microtiter Plates. *ACS Nano* 15, 3, 4034–4044.

2020

7. **S. -T. Wang**, M. A. Gray, S. Xuan, Y. Lin, A. I. Nguyen, N. Todorova, M. M. Stevens, C. R. Bertozzi, R. N. Zuckermann, O. Gang. DNA Origami Protection and Molecular Interfacing through Engineered Sequence-Defined Peptoids. *Proc. Natl. Acad. Sci.*, 117, 6339–6348.

***Highlighted by the Office of Science, Department of Energy (DOE), PNAS In This Issue, Molecular Foundry (LBNL) news, Center for Functional Nanomaterials and Brookhaven Lab news, Stanford ChEM-H news, and European Pharmaceutical Reviews.**

8. Y. Xiong, J. Huang, **S. -T. Wang**, S. Zafar, O. Gang. Oxidation Catalyst Sensor for DNA-Scaffolded Enzyme. *ACS Nano*, 14, 14646–14654.

9. J. Freeland, L. Zhang, **S. -T. Wang**, M. Ruiz, Y. Wang. Bent DNA bows as amplifiers and biosensors 1 for detecting DNA-interacting salts and molecules. *Sensors*, 20, 3112.

2019

10. **S. -T. Wang**, Y. Lin, M. H. Nielsen, C. Song, M. R., Thomas, C. D. Spicer, P. Ercius, S. Aloni, M. M. Stevens. Shape-Controlled Synthesis and *In Situ* Characterisation of Anisotropic Au using Nanomaterials Liquid Cell Transmission Electron Microscopy. *Nanoscale*, 11, 16801–16809.

2017

11. **S. -T. Wang**, Y. Lin, N. Todorova, Y. Xu, M. Mazo, S. Rana, V. Leonardo, C. D. Spicer, A. A. Edwards, B. Alexander, S. J. Matthews, I. Yarovsky, M. M. Stevens. Facet Dependent Islet Amyloid Polypeptide Interactions with Gold Nanoparticles: Implications for Fibril Formation and Peptide Induced Lipid Membrane Disruption. *Chem. Mat.*, 29, 1550–1560.

12. **S. -T. Wang**, Y. Lin, R. K. Spencer, A. I. Nguyen, M. R. Thomas, N. Amdursky, E. T. Pashuck, S. C. Skaalure, C. Song, P. A. Parmar, R. M. Morgan, P. Ercius, S. Aloni, R. N. Zuckermann, M. M. Stevens. Sequence-Dependent Self-Assembly and Structural Diversity of Islet Amyloid Polypeptide Derived β -Sheet Fibrils. *ACS Nano*, 11, 8579–8589.

13. **S. -T. Wang**, Y. Lin, C. -C. Hsu, C. D. Spicer, M. M. Stevens. Probing Amylin Fibrillation at the Early Stage via a Tetracysteine-Targeting Fluorophore. *Talanta*, 173, 44-50.

14. Y. Lin, E. T. Pashuck, M. R. Thomas, N. Amdursky, **S. -T. Wang**, L. W. Chow, M. M. Stevens. Plasmonic Chirality Imprinting on DNA-Mimicking Amyloid-like Fibrils via Metal-Nucleobase Affinity. *Angew. Chem. Int. Ed.*, 56, 2361–2365.

2015 and before

15. **S. -T. Wang**, Y. Lin, C. D. Spicer, M. M. Stevens. Bio-Inspired Maillard-Like Reactions Enable a Simple and Sensitive Assay for Colorimetric Detection of Methylglyoxal. *Chem. Commun.*, 51, 11026–11029.

16. C. -H. Tu, C. -H. Wu, C. -C. Chen, Y. -C. Li, **S. -T. Wang**, Y. -C. Chen, C. -H. Lu, Y. -J. Cai, J. -H. Lin, C. -P. Liu. Direct growth of hollow carbon nanorods on porous graphenic carbon film without catalysts. *Carbon*, 84, 272–279.

17. C. -Y. Liao, **S. -T. Wang**, F. -C. Chang, H. P. Wang, and H. -P. Lin. Preparation of TiO₂ Hollow Spheres for DSSC Photoanodes. *J. Phys. Chem. Solids*, 75, 38–41.

MANUSCRIPT IN PREPARATION

1. **S. -T. Wang**, D. M. Kim, M. Anahtar, C. S. Wang, T. S. Samad, C. Ngambenjwong, C. M. Zheng, V. Kumar, J. Kirkpatrick, S. Patel, H. Fleming, S. N. Bhatia. Engineering Orthogonal Breath Biomarkers for Multiplexed Cancer Diagnostics.

2. Y. Xiong[†], **S. -T. Wang**[†], D. Nykypanchuk, H. Zhang, O. Gang. Reconfigurable Nano-Object Arrays for Information Processing.

3. J. Liu, **S. -T. Wang**, M. Zhang, Z. Hu H. Wu, O. Gang, G. Ren. Individual-molecule 3D structures reveal the dynamics of 2D lattice.

PATENT APPLICATION

S. -T. Wang, O. Gang, R. N. Zuckermann, C. R. Bertozzi. Side Chain Modified Peptoids Useful as Structure-Stabilizing Coating for Biomaterials. *U.S. Patent Application 17/015,532*.

PROPOSAL WRITING EXPERIENCES

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| 2023 | Author, “Engineering tumor targeting <i>in vivo</i> nanosensors for improving sensitivity of cancer detection”, user proposal to the Laboratory for BioMolecular Structure (LBMS), Brookhaven National Laboratory, Upton, NY. Proposal accepted. |
| 2023 | Contribution, “Development of a diagnostic to classify pediatric pneumonia etiology” Open Philanthropy. Proposal was awarded. |
| 2020 | Contribution, “Decoy polymer particle system for COVID-19 viral capture and therapy”, Laboratory Directed Research and Development (LDRD), Brookhaven National Laboratory, Upton, NY. Proposal awarded. |
| 2017 | Author, “Cryogenic Transmission Electron Tomography Determination of Single Domains and Structural Changes of Proteins Encapsulated in DNA Origami Frames”, user proposal to the Molecular Foundry, Lawrence Berkeley National Laboratory, Berkeley CA. Proposal accepted. |
| 2017 | Author, “ <i>De Novo</i> Peptides and Peptoid Sequences to Protect DNA Origami from Environmental-Induced Damage”, user proposal to the Molecular Foundry, Lawrence Berkeley National Laboratory. Proposal accepted |

- 2016 Author, “*In-situ* Study of Plasmonic Biodiagnostic Nanosystems with Liquid Cell Transmission Electron Microscopy”. iSense Mobility Fellowship awarded by the Engineering and Physical Sciences Research Council (EPSRC), United Kingdom.
- 2016 Author, “Exploring Nucleation and Growth of Noble Metal Nanoparticles at Amyloid-Like Fibrillar Peptide Templates Exhibiting Specific Crystallographic Facet Recognizing Sequences”, user proposal to the Molecular Foundry, Lawrence Berkeley National Laboratory. Proposal accepted.

CONTRIBUTED PRESENTATIONS

Oral presentations

- 2024 MIT Ludwig Center Annual Retreat: Engineering Orthogonal Breath Biomarkers for Multiplexed Cancer Diagnostics.
- 2024 MIT Koch Institute Friday Focus Seminar: Take Your BREATH Away: Engineering Orthogonal Breath Biomarkers for Multiplexed Cancer Diagnostics.
- 2023 European Society of Applied Biocatalysis, Biocatalysis and Molecular Medicine webinar: Engineering Synthetic Biomarkers for Disease Diagnostics.
- 2023 BMES Annual Meeting (October) and MRS Fall Meeting (November): Multiplexed Breath Biopsy of Lung Disease by Controlled Chemical Signal Activation.
- 2023 MIT Koch Institute Marble Center for Cancer Nanomedicine October seminar: Multiplexed Breath Biopsy of Lung Disease by Controlled Chemical Signal Activation.
- 2022 Peptoid Summit: Nanomaterial stabilization by engineered sequence-defined peptoids.
- 2021 Materials Research Society Fall Meeting: Compact Peptoid Molecular Brushes for Nanoparticle Passivation.
- 2020 AIChE Annual Meeting: Self-Organized Protein Arrays Guided by DNA Origami Lattices.
- 2020 NLSL-II & CFN User’s Meeting, Brookhaven National Laboratory: Design and Engineering of Synthetic Biomolecular Toolbox for Biosensing and Nanomedicine.
- 2019 MRS Fall Meeting: Engineering Sequence-Defined Peptoids for DNA Origami Protection and Molecular Interfacing.
- 2017 MRS Fall Meeting: *In Situ* Study of the Controlled Growth of Electron Beam-Induced Branch-Shaped Au Particles.
- 2017 Molecular Foundry User’s Meeting, Lawrence Berkeley National Laboratory: *In Situ* Study of the Controlled Growth of Electron Beam-Induced Branch-Shaped Au Particles.
- 2016 MRS Spring Meeting: Effect of Nanoparticles on Islet Amyloid Polypeptide (IAPP) Fibrillation and Peptide Cytotoxicity towards Lipid Membrane Disruption.

Poster presentations

- 2023 MIT Ludwig Center Annual Retreat: Multiplexed Breath Biopsy of Lung Disease by Controlled Chemical Signal Activation.
- 2020 MRS Fall Meeting: Designed Organization of Proteins in Multidimensional Arrays with Preserved Biological Functionality.
- 2020 BMES Meeting: Self-Organized Protein Arrays Guided by DNA Origami Lattices.
- 2016 iSense EPSRC IRC Meeting: Probing Protein Interactions for Diagnostic and Therapeutic Applications.