Stanford

Rebecca Pinals

Assistant Professor of Chemical Engineering

Bio

BIO

The brain is a fascinatingly complex and delicate system of biomolecules, cells, and dynamic interactions that must be carefully maintained to support human health. When this balance is disrupted, disease can arise. Neurodegenerative dementias including Alzheimer's disease are highly prevalent and profoundly devastating, yet remain largely untreatable or incurable.

The Pinals Lab engineers neuro-models and nano-tools to uncover mechanisms of neurodegenerative disease and intervene to halt—and even reverse—disease progression. A particular emphasis of our work is on the blood–brain barrier (BBB), the vascular interface that serves as the molecular gateway into the brain. We leverage human induced pluripotent stem cells (iPSCs) to build 3D cellular systems, providing a platform to recapitulate human brain properties and pathologies. In parallel, we design nanoparticles to report on real-time neurochemical processes, enabling unprecedented access to dynamic and spatially resolved biomolecular phenomena, and to modulate disease states. By integrating advanced human brain tissue models with rationally designed nanotechnologies, we aim to generate fundamental insights and tools that translate into meaningful impacts for human health.

ACADEMIC APPOINTMENTS

- Assistant Professor, Chemical Engineering
- Member, Bio-X
- Institute Scholar, Sarafan ChEM-H
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- AIChE 35 Under 35, AIChE (2026)
- Dr. Laure Aurelian Biomedical Research Award, The Aurelian Biomedical Research Award Endowment (2026)
- Terman Faculty Fellow, Stanford University (2025-2028)
- MAC3 Impact Philanthropies Faculty Fellow, Stanford University (2025-2027)
- Knight Initiative Faculty Fellow, Stanford University (2025)
- Scialog Fellow: Neurobiology and Changing Ecosystems, Research Corporation for Science Advancement (2025)
- Career Award at the Scientific Interface, Burroughs Wellcome Fund (2023)
- Victor K. LaMer Award, ACS Division of Colloid and Surface Chemistry (2022)
- 1st place Langmuir Student Presentation Award, ACS Division of Colloid and Surface Chemistry (2021)
- Schmidt Science Fellowship, The Rhodes Trust (2021)

- 1st place Bionanotechnology Graduate Student Award, AIChE (2020)
- CAS Future Leader, American Chemical Society (2020)
- Chemical Engineering Rising Star, Massachusetts Institute of Technology (2020)
- Distinguished Young Scholars Seminar Speaker, University of Washington (2020)
- Women Chemists Committee / Merck Research Award, American Chemical Society (2020)
- ACTIVE Future Faculty Fellowship, University of Colorado Boulder (2019)
- Excellence in Teaching Award, University of California, Berkeley (2019)
- NSF Graduate Research Fellowship, National Science Foundation (2018)
- Outstanding Graduate Student Instructor Award, University of California, Berkeley (2017)

PROFESSIONAL EDUCATION

- Postdoctoral Fellow, Massachusetts Institute of Technology , Neuroscience (2025)
- PhD, University of California, Berkeley , Chemical and Biomolecular Engineering (2021)
- BS, Brown University , Chemical and Biochemical Engineering (2016)

LINKS

- Pinals Lab Site: https://www.pinalslab.com/

Teaching

COURSES

2026-27

- Colloquium: CHEMENG 699 (Aut, Spr)
- Energy and Mass Transport: CHEMENG 120B (Spr)
- Undergraduate Honors Seminar: CHEMENG 191H (Aut, Win, Spr)

2025-26

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STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Connie An, Luna Hwang, Duo Sun

Postdoctoral Faculty Sponsor

Djuna von Maydell

Doctoral Dissertation Advisor (AC)

Yunbeen Bae, Daniel Perez Torres

Orals Evaluator

Nadine Humphrey, Goldie Roth

Doctoral Dissertation Co-Advisor (AC)

Dylan Reil, Madhumitha Suresh

Doctoral (Program)

Amanda Cai

Publications

PUBLICATIONS

- **Fragment morphometry analysis and same-color-channel separation enable reproducible quantification across BBB models.** *Methods (San Diego, Calif.)*
  Peck, B. D., O'Hare, N. R., Ferris, C. F., Pinals, R. L., Ebong, E. E.
  2026

- **Protein corona formed on lipid nanoparticles compromises delivery efficiency of mRNA cargo**
  Voke, E., Arral, M. L., Squire, H. J., Lin, T., Zheng, L., Coreas, R., Lui, A., Iavarone, A. T., Pinals, R. L., Whitehead, K. A., Landry, M. P.
  CELL PRESS.2026: 111a

- **Protein Corona Selectivity on Carbon Nanotube Biosensors is Driven by Surface Coating and Chirality** *Protein Corona Selectivity on Carbon Nanotube Biosensors is Driven by Surface Coating and Chirality*
  Pinals, R. L., Li, H., Ramirez, R., Pfammatter, S., Zimmermann, M., Perez Torres, D. J., Flavel, B. S., Vukovic, L., Herrmann, I. K., Nißler, R.
  2026

- **Engineered 3D immuno-glial-neurovascular human miBrain model.** *Proceedings of the National Academy of Sciences of the United States of America*
  Stanton, A. E., Bubnys, A., Agbas, E., James, B., Park, D. S., Jiang, A., Pinals, R. L., Liu, L., Truong, N., Loon, A., Staab, C., Cerit, O., Wen, et al
  2025; 122 (42): e2511596122

- **Protein corona formed on lipid nanoparticles compromises delivery efficiency of mRNA cargo.** *Nature communications*
  Voke, E., Arral, M. L., Squire, H. J., Lin, T. J., Zheng, L., Coreas, R., Lui, A., Iavarone, A. T., Pinals, R. L., Whitehead, K. A., Landry, M. P.
  2025; 16 (1): 8699

- **Vascular-Perfusable Human 3D Brain-on-Chip.** *bioRxiv : the preprint server for biology*
  Stanton, A. E., Pinals, R. L., Choi, A., Truong, N., Kang, E., Jiang, A., Lozano Cruz, C. F., Hawkins, S., Sarcar, R., Volkova, A., King, O., Agbas, E., Nakano, et al
  2025

- **Mapping the Morphology of DNA on Carbon Nanotubes in Solution Using X-ray Scattering Interferometry.** *Journal of the American Chemical Society*
  Rosenberg, D. J., Cunningham, F. J., Hubbard, J. D., Goh, N. S., Wang, J. W., Nishitani, S., Hayman, E. B., Hura, G. L., Landry, M. P., Pinals, R. L.
  2024; 146 (1): 386-398

- **Inferring local molecular dynamics from the global actin network structure: A case study of 2D synthetic branching actin networks.** *Journal of theoretical biology*
  Rostami, M. W., Bannish, B. E., Gasior, K., Pinals, R. L., Copos, C., Dawes, A. T.
  2023; 575: 111613

- **Building in vitro models of the brain to understand the role of APOE in Alzheimer's disease.** *Life science alliance*
  Pinals, R. L., Tsai, L. H.
  2022; 5 (11)

- **How Early-Career Scientists Responded with Resiliency to the Space Created by the COVID-19 Pandemic.** *ACS central science*
  Fung, F. M., Jilani, S. Z., Ohnsorg, M. L., Pinals, R. L., Saraf, M., Tropp, J., Carlton, P.
  2022; 8 (3): 294-296

- **Nanoparticle cellular internalization is not required for RNA delivery to mature plant leaves.** *Nature nanotechnology*
  Zhang, H., Goh, N. S., Wang, J. W., Pinals, R. L., González-Grandío, E., Demirer, G. S., Butrus, S., Fakra, S. C., Del Rio Flores, A., Zhai, R., Zhao, B., Park, S. J., Landry, et al
  2022; 17 (2): 197-205

- **Supervised learning model predicts protein adsorption to carbon nanotubes.** *Science advances*
  Ouassil, N., Pinals, R. L., Del Bonis-O'Donnell, J. T., Wang, J. W., Landry, M. P.

2022; 8 (1): eabm0898

- **In Planta Nanosensors: Understanding Biocorona Formation for Functional Design.** *ACS sensors*
  Voke, E., Pinals, R. L., Goh, N. S., Landry, M. P.
  2021; 6 (8): 2802-2814
- **Extraction of Viral Nucleic Acids with Carbon Nanotubes Increases SARS-CoV-2 Quantitative Reverse Transcription Polymerase Chain Reaction Detection Sensitivity.** *ACS nano*
  Jeong, S., González-Grandío, E., Navarro, N., Pinals, R. L., Ledesma, F., Yang, D., Landry, M. P.
  2021; 15 (6): 10309-10317
- **Rapid SARS-CoV-2 Spike Protein Detection by Carbon Nanotube-Based Near-Infrared Nanosensors.** *Nano letters*
  Pinals, R. L., Ledesma, F., Yang, D., Navarro, N., Jeong, S., Pak, J. E., Kuo, L., Chuang, Y. C., Cheng, Y. W., Sun, H. Y., Landry, M. P.
  2021; 21 (5): 2272-2280
- **Quantitative Protein Corona Composition and Dynamics on Carbon Nanotubes in Biological Environments.** *Angewandte Chemie (International ed. in English)*
  Pinals, R. L., Yang, D., Rosenberg, D. J., Chaudhary, T., Crothers, A. R., Iavarone, A. T., Hammel, M., Landry, M. P.
  2020; 59 (52): 23668-23677
- **Mitigation of Carbon Nanotube Neurosensor Induced Transcriptomic and Morphological Changes in Mouse Microglia with Surface Passivation.** *ACS nano*
  Yang, D., Yang, S. J., Del Bonis-O'Donnell, J. T., Pinals, R. L., Landry, M. P.
  2020; 14 (10): 13794-13805
- **Engineering at the nano-bio interface: harnessing the protein corona towards nanoparticle design and function.** *The Analyst*
  Pinals, R. L., Chio, L., Ledesma, F., Landry, M. P.
  2020; 145 (15): 5090-5112
- **Binding Affinity and Conformational Preferences Influence Kinetic Stability of Short Oligonucleotides on Carbon Nanotubes** *ADVANCED MATERIALS INTERFACES*
  Alizadehmojarad, A. A., Zhou, X., Beyene, A. G., Chacon, K. E., Sung, Y., Pinals, R. L., Landry, M. P., Vukovi, L.
  2020; 7 (15)
- **Carbon nanocarriers deliver siRNA to intact plant cells for efficient gene knockdown.** *Science advances*
  Demirer, G. S., Zhang, H., Goh, N. S., Pinals, R. L., Chang, R., Landry, M. P.
  2020; 6 (26): eaaz0495
- **Graphene Quantum Dot Oxidation Governs Noncovalent Biopolymer Adsorption.** *Scientific reports*
  Jeong, S., Pinals, R. L., Dharmadhikari, B., Song, H., Kalluri, A., Debnath, D., Wu, Q., Ham, M. H., Patra, P., Landry, M. P.
  2020; 10 (1): 7074
- **Covalent Surface Modification Effects on Single-Walled Carbon Nanotubes for Targeted Sensing and Optical Imaging** *ADVANCED FUNCTIONAL MATERIALS*
  Chio, L., Pinals, R. L., Murali, A., Goh, N. S., Landry, M. P.
  2020; 30 (17)
- **Corona Exchange Dynamics on Carbon Nanotubes by Multiplexed Fluorescence Monitoring.** *Journal of the American Chemical Society*
  Pinals, R. L., Yang, D., Lui, A., Cao, W., Landry, M. P.
  2020; 142 (3): 1254-1264
- **Connecting Actin Polymer Dynamics Across Multiple Scales** *Using Mathematics to Understand Biological Complexity*
  Copos, C., Bannish, B., Gasior, K., Pinals, R. L., Rostami, M. W., Dawes, A. T.
  Springer.2020
- **Chemometric Approaches for Developing Infrared Nanosensors To Image Anthracyclines.** *Biochemistry*
  Del Bonis-O'Donnell, J. T., Pinals, R. L., Jeong, S., Thakrar, A., Wolfinger, R. D., Landry, M. P.
  2019; 58 (1): 54-64
- **Stochastic Simulation of Dopamine Neuromodulation for Implementation of Fluorescent Neurochemical Probes in the Striatal Extracellular Space.** *ACS chemical neuroscience*

Beyene, A. G., McFarlane, I. R., Pinals, R. L., Landry, M. P.
2017; 8 (10): 2275-2289

- **Direct Conversion of Hydride- to Siloxane-Terminated Silicon Quantum Dots** *JOURNAL OF PHYSICAL CHEMISTRY C*
  Anderson, R. T., Zang, X., Fernando, R., Dzara, M. J., Ngo, C., Sharps, M., Pinals, R., Pylypenko, S., Lusk, M. T., Sellinger, A.
  2016; 120 (45): 25822-25831