Stanford

Kang Rui Garrick Lim

Postdoctoral Scholar, Chemical Engineering

Bio

BIO

I am a materials chemist from Singapore and presently, a Stanford Energy Postdoctoral Fellow with Prof. Matteo Cargnello and Prof. Thomas F. Jaramillo at Stanford University. In 2027, I will start as a Nanyang Assistant Professor at the School of Materials Science & Engineering in Nanyang Technological University (NTU), Singapore. I completed my PhD and Master's degree in chemistry at Harvard University under Prof. Joanna Aizenberg, and my Bachelor's degree in chemistry from the National University of Singapore (NUS).

At Stanford and SLAC National Accelerator Laboratory (2025-), I work on colloidal catalyst design for CO2 conversion as part of the SUNCAT Center for Interface Science and Catalysis. During my PhD at Harvard (2020-2025), I integrated colloidal templating and self-assembly concepts into catalyst design to design 3D macroporous inverse opal structures bearing partially embedded dilute alloy nanoparticles to serve as a model thermocatalytic platform. Previously, at NUS and IMRE A*STAR in Singapore (2018-2020), I synthesized MXene nanohybrids for electrocatalysis and designed core-shell quantum dots for light harvesting. My broader research interest is to leverage on colloidal design of catalytic architectures–their active sites and immediate environment–to bridge the materials gap in catalyst design for low carbon energy research.

HONORS AND AWARDS

- Stanford Energy Postdoctoral Fellowship, Stanford University (2025-2028)
- Sabin Metal Corporation Ron Bleggi Student Award, International Precious Metals Institute (2025)
- Catalysis & Reaction Engineering Division Travel Award, American Institute of Chemical Engineers (AIChE) (2025)
- Lindau Young Scientist, Lindau Nobel Laureates Meeting (2025)
- Graduate Student Gold Award & Future Leader, Materials Research Society (MRS) (2024)
- Departmental Travel Prize for Outstanding Research Achievement, Harvard University (2024)
- Colloids and Surface Science Division Travel Award, American Chemical Society (ACS) (2024)
- Kokes Award, North American Catalysis Society (2023)
- A*STAR Singapore National Science Scholarship (PhD), A*STAR Singapore (2020-2025)
- A*STAR Undergraduate Scholarship, A*STAR Singapore (2015-2019)

PROFESSIONAL EDUCATION

- Doctor of Philosophy, Harvard University (2025)
- Master of Arts, Harvard University (2022)
- Bachelor of Science, National University of Singapore , Chemistry (2019)

STANFORD ADVISORS

- Matteo Cargnello, Postdoctoral Faculty Sponsor

Research & Scholarship

LAB AFFILIATIONS

- Matteo Cargnello (7/25/2025)
- Thomas Jaramillo (7/25/2025)

Publications

PUBLICATIONS

- **Raspberry-Colloid-Templated Catalysts as a Versatile and Stable Thermocatalytic Platform.** *Accounts of chemical research*
  Lim, K. R., Aizenberg, M., Aizenberg, J.
  2025
- **Modeling electron storage at the interface between Au and anatase-TiO₂ under ambient conditions** *CHEM CATALYSIS*
  Li, Y., Cheng, D., Son, G., Shneidman, A., Lim, K., Aizenberg, J., Sautet, P.
  2025; 5 (9)
- **Nanoscale wetting controls reactive Pd ensembles in synthesis of dilute PdAu alloy catalysts.** *Nature communications*
  Lim, K. R., Owen, C. J., Kaiser, S. K., Routh, P. K., Mendoza, M., Park, K. K., Kim, T. S., Garg, S., Gardener, J. A., Russotto, L., O'Connor, C. R., Bijl, M., Aizenberg, et al
  2025; 16 (1): 6293
- **Effects of Pd ensemble size in dilute and single atom alloy PdAu catalysts for one-pot selective hydrogenation and reductive amination** *CATALYSIS SCIENCE & TECHNOLOGY*
  Lim, K., Azizli, T., Kaiser, S. K., Aizenberg, M., Montemore, M. M., Aizenberg, J.
  2025
- **Active and Stable PtPd Diesel Oxidation Catalysts under Industry-Defined Test Protocols** *CHEMSUSCHEM*
  Lim, K., Shirman, T., Toops, T. J., Alvarenga, J., Aizenberg, M., Aizenberg, J.
  2025: e202500295
- **Partial PdAu nanoparticle embedding into TiO2 support accentuates catalytic contributions from the Au/TiO2 interface** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Lim, K., Kaiser, S. K., Herring, C. J., Kim, T., Perich, M., Garg, S., O'Connor, C. R., Aizenberg, M., van der Hoeven, J. E. S., Reece, C., Montemore, M. M., Aizenberg, J.
  2025; 122 (2): e2422628122
- **Restructuring dynamics of surface species in bimetallic nanoparticles probed by modulation excitation spectroscopy** *NATURE COMMUNICATIONS*
  Routh, P. K., Redekop, E., Prodinger, S., van der Hoeven, J. E. S., Lim, K., Aizenberg, J., Nachtegaal, M., Clark, A. H., Frenkel, A. I.
  2024; 15 (1): 6736
- **Colloidal Templating in Catalyst Design for Thermocatalysis** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Lim, K., Aizenberg, M., Aizenberg, J.
  2024; 146 (32): 22103-22121
- **Controlling nanoparticle placement in Au/TiO₂ inverse opal photocatalysts** *NANOSCALE*
  Bijl, M., Lim, K., Garg, S., Nicolas, N. J., Visser, N. L., Aizenberg, M., van der Hoeven, J. E. S., Aizenberg, J.
  2024; 16 (29): 13867-13873
- **Deconvoluting the Individual Effects of Nanoparticle Proximity and Size in Thermocatalysis** *ACS NANO*
  Lim, K., Kaiser, S. K., Wu, H., Garg, S., O'Connor, C. R., Reece, C., Aizenberg, M., Aizenberg, J.
  2024; 18 (24): 15958-15969

- **Nanoparticle proximity controls selectivity in benzaldehyde hydrogenation** *NATURE CATALYSIS*
  Lim, K., Kaiser, S. K., Wu, H., Garg, S., Perxes Perich, M., van der Hoeven, J. E. S., Aizenberg, M., Aizenberg, J.
  2024; 7 (2): 172-184
- **Identifying the Optimal Pd Ensemble Size in Dilute PdAu Alloy Nanomaterials for Benzaldehyde Hydrogenation** *ACS CATALYSIS*
  Kaiser, S. K., van der Hoeven, J. E. S., Yan, G., Lim, K., Ngan, H., Garg, S., Karatok, M., Aizenberg, M., Aizenberg, J., Sautet, P., Friend, C. M., Madix, R. J.
  2023; 13 (18): 12092-12103
- **Fluoride-free synthesis and long-term stabilization of MXenes** *JOURNAL OF MATERIALS RESEARCH*
  Wong, A., Lim, K., Seh, Z.
  2022; 37 (22): 3988-3997
- **Fundamentals of MXene synthesis** *NATURE SYNTHESIS*
  Lim, K., Shekhirev, M., Wyatt, B. C., Anasori, B., Gogotsi, Y., Seh, Z.
  2022; 1 (8): 601-614
- **2H-MoS₂ on Mo₂CT_x MXene Nanohybrid for Efficient and Durable Electrocatalytic Hydrogen Evolution** *ACS NANO*
  Lim, K., Handoko, A. D., Johnson, L. R., Meng, X., Lin, M., Subramanian, G., Anasori, B., Gogotsi, Y., Vojvodic, A., Seh, Z.
  2020; 14 (11): 16140-16155
- **High Quantum Yield Water-Dispersed Near-Infrared In(Zn)As-In(Zn)P-GaP-ZnS Quantum Dots with Robust Stability for Bioimaging** *ADVANCED MATERIALS INTERFACES*
  Lim, K., Darwan, D., Wijaya, H., Lim, Z., Shanmugam, J., Wang, T., Lim, L., Ang, W., Tan, Z.
  2020; 7 (22)
- **Rational Design of Two-Dimensional Transition Metal Carbide/Nitride (MXene) Hybrids and Nanocomposites for Catalytic Energy Storage and Conversion** *ACS NANO*
  Lim, K., Handoko, A. D., Nemani, S., Wyatt, B., Jiang, H., Tang, J., Anasori, B., Seh, Z.
  2020; 14 (9): 10834-10864
- **Atomistic modeling of electrocatalysis: Are we there yet?** *WILEY INTERDISCIPLINARY REVIEWS-COMPUTATIONAL MOLECULAR SCIENCE*
  Abidi, N., Lim, K., Seh, Z., Steinmann, S. N.
  2021; 11 (3)
- **Deep Fluorescence Imaging by Laser-Scanning Excitation and Artificial Neural Network Processing** *ADVANCED OPTICAL MATERIALS*
  Darwan, D., Lim, K., Wijaya, H., Lim, Z., Wang, T., Ang, W., Tan, Z.
  2020; 8 (19)
- **Efficient Near-Infrared Light-Emitting Diodes based on In(Zn)As-In(Zn)P-GaP-ZnS Quantum Dots** *ADVANCED FUNCTIONAL MATERIALS*
  Wijaya, H., Darwan, D., Zhao, X., Ong, E., Lim, K., Wang, T., Lim, L., Khoo, K., Tan, Z.
  2020; 30 (4)
- **Large-Stokes-Shifted Infrared-Emitting InAs-In(Zn)P-ZnSe-ZnS Giant-Shell Quantum Dots by One-Pot Continuous-Injection Synthesis** *CHEMISTRY OF MATERIALS*
  Wijaya, H., Darwan, D., Lim, K., Wang, T., Khoo, K., Tan, Z.
  2019; 31 (6): 2019-2026