

Kaiyi Jiang

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Education

Massachusetts Institute of Technology, Cambridge, MA

Doctor of Philosophy (Ph.D.) in Biological Engineering

GPA: 5.0 out of 5.0

Expected May 2025

Rice University, Houston, TX

Bachelor of Engineering in Biomedical Engineering (Concentration in Statistic)

GPA: 4.0 out of 4.0 (**Summa cum laude**)

May 2021

Publications & Presentations (* denotes co-first author)

- **Jiang, K.** *, Koob, J. *, Chen, X.D. *, Krajewski, R.N. *, Zhang, Y. *, Volf, V., Zhou, W., Sgrizzi, S.R., Villiger, L., Gootenberg, J.S., Chen, F., Abudayyeh, O.O. (2022). Programmable eukaryotic protein synthesis with RNA sensors by harnessing ADAR. **Nature Biotechnology**.
- Kato, K. *, Okazaki, S. *, Schmitt-Ulms, C. *, **Jiang, K.** *, Zhou, W., Ishikawa, J., Isayama, Y., Adachi, S., Nishizawa, T., Makarova, K.S., et al. (2022). RNA-triggered protein cleavage and cell death by the RNA-guided type III-E CRISPR-Cas nuclease-protease complex. **Science**.
- Zhang, L., Zhang, Q., Hinojosa, D.T., **Jiang, K.**, Pham, Q.K., Xiao, Z., Colvin, V.L., Bao, G. (2022) Multifunctional Magnetic Nanoclusters Can Induce Immunogenic Cell Death and Suppress Tumor Recurrence and Metastasis. **ACS Nano**.
- Ioannidi, E.I., Yarnall, M.T.N., Schmitt-Ulms, C., Krajewski, R.N., Lim, J., Villiger, L., Zhou, W., **Jiang, K.**, Roberts, N., Zhang, L., et al. (2022). Drag-and-drop genome insertion without DNA cleavage with CRISPR-directed integrases. **Nature Biotechnology** [In press]
- **Jiang, K.**, Zhang, Q., Hinojosa, D.T., Zhang, L., Xiao, Z., Yin, Y., Tong, S., Colvin, V.L., Bao, G., 2021. Controlled oxidation and surface modification increase heating capacity of magnetic iron oxide nanoparticles. **Applied Physics Reviews** 8, 031407. [Featured Article with scilight commentary]
- Sebesta, C., Torres Hinojosa, D., Wang, B., Asfour, J., Li, Z., Duret, G., **Jiang, K.**, Xiao, Z., Zhang, L., Zhang, Q., et al. (2022). Subsecond multichannel magnetic control of select neural circuits in freely moving flies. **Nature Materials**.
- Yang X, **Jiang K**, Trenton P, Her J, Rocks JW, Mehta P, Bashor CJ. (2022). Engineering a Synthetic Post-Translational Network through Phosphorylation Regulated Push-Pull Interaction Module. [Submitted to **Science**]
- **Jiang K**, Zhang L, Bao G. (2021). Magnetic Iron Oxide Nanoparticles for Biomedical Applications. *Current Opinion in Biomedical Engineering*.
- **Jiang K**, Tong S, Bao G. (2019). Oxidation of Iron Oxide Nanoparticles Improves Magnetic Fluid Heating. Oral Presentation at the annual meeting of Biomedical Engineering Society (BMES), Philadelphia, PA.
- Zhang L, **Jiang K**, Zhang Q, Tong S, Colvin V, Bao G. (2019). Magnetic Targeting of Stem Cells Using Super-Susceptible Iron Oxide Nanocrystal Clusters. Poster Presentation at the annual meeting of Biomedical Engineering Society (BMES), Philadelphia, PA.
- Yin Y, **Jiang K**, Tong S, Bao G. (2019). Delivery of Magnetic Nanoparticles for In Vivo T Cells Tracking and Targeting. Presentation at the annual meeting of Biomedical Engineering Society (BMES), Philadelphia, PA.

Awards & Honors

- Distinction in Research and Creative Works 2021
- Outstanding Junior in Bioengineering 2020
- Tau Beta Pi Member 2019-2021
- Louis J. Walsh Scholarships 2019-2021
- Best Oral Presentation Award, Rice University Research Symposium 2019
- President's Honor Roll 2017-2021

Research Experience

AbuGoot Laboratory, Massachusetts Institute of Technology

Advisor: Dr. Jonathan Gootenberg and Dr. Omar Abudayyeh

2021-Now

Project: Engineering reprogrammable RNA sensors

- Designed reprogrammable ADAR sensors (RADARS) based RNA sensor that tracks endogenous mRNA transcript and release arbitrary payload upon ADAR mediated stop codon editing.
- Engineered RNA folding and translational repression to enhance RADARS performance
- Designed tunable one-piece RNA sensor that tracks endogenous gene perturbations with high precision
- Deployed RADARS for in vivo detection of tissue markers with live bioluminescence imaging.

Laboratory of Synthetic Biology, Rice University

2019-2021

Advisor: Dr. Caleb Bashor

Project: Building post-translational synthetic network through phosphorylation based "push-pull" protein circuits

- Established a biophysical models to characterize each protein part and predict protein part/genetic circuit selection in large design space
- Exploited natural kinase and substrate for enhanced orthogonality in synthetic circuit through protein truncation and domain engineering
- Designed highly tunable phosphorylation cascades through Kozak sequence, leucine zipper variants and catalytic mutants
- Screened SH2 against substrate specificity for making multiple orthogonal connections inside a network
- Engineered tandem SH2 for enhanced interaction of SH2 with phosphorylated substrates
- Engineered diffusion of protein from membrane to nucleus through NLS-NES library
- Engineered receptor-kinase system through linker, transmembrane domain and signal peptide selection.

Laboratory of Bimolecular Engineering and Nanomedicine, Rice University

2017 – 2021

Advisor: Dr. Gang Bao

Project: Development of personalized immunotherapy platform through hybrid nanoparticle-baculoviral vector system for in vivo gene disruption using CRISPR/Cas9

- Improved the magnetic control of MNP-BV vector system through fine tuning the size and magnetic properties of nanoparticles
- Optimized the interaction between nanoparticles and baculovirus for better control of the system through surface molecules engineering
- Optimized the packaging of CRISPR/Cas9 system in baculovirus and the guide RNA design for targeting PD-L1 pathway.
- Evaluated gene editing efficiency of baculovirus in disruption of immune suppressive PD-L1 pathway in vivo

Project: Building a magneto-immunotherapy platform using nanoparticle-drug hybrid delivery vehicle.

- Designed novel nanocluster-AAPH hybrid structure for enhanced loading and release of free radicals from nanoparticles to disrupt cancer microenvironment
- Tuned the kinetics of free radical release under alternating magnetic field through nanoclusters synthesis and coating optimization
- Exploited cytokines release for enhanced tuning of tumor microenvironment from “cold” to “hot”
- Demonstrated T cell infiltration in subcutaneous solid tumor in mice model and tumor shrinkage

Internship Experience

Regeneron Pharmaceuticals, Therapeutic Protein (Antibody) Department, Tarrytown, NY

June-August 2019

Advisor: Sang-Ryul Lee

Project: The role of adjuvants in eliciting immune responses in mice

- Mastered the use of ELISA, MSD, ELISPOT, Flow Cytometry, and Immunohistochemistry
- Identified the role of different adjuvants in eliciting immune response
- Investigated the mechanism behind germinal centers, plasma and memory cells formation with different adjuvants
- Participated in the development of therapeutic antibodies for bladder cancer and triple negative breast cancer

Skills

- Proficient Programming Language: MATLAB; R; Python
- ELISA, ELISPOT, Flow Cytometry, Immunohistochemistry, Sterile Cell Culture, Confocal Imaging
- Proficient Software Use: Adobe Illustrator, Flowjo, GraphPad Prism, Origin, PowerPoint, Excel