Zeyu (Alban) LI

Nucleic Acid Scientist | DNA/RNA Technologies | 626-826-5327 | zl788@cornell.edu | zeyuli.net | Available May 2026

Nucleic acid scientist with expertise in DNA/RNA technologies and polymer-based biomaterials. Led a DoD-funded 11 km² field deployment of DNA-barcoded tracers with qPCR detection 7 km downstream from less than 1 mg DNA release in a positive-pressure bio-cleanroom. Built a high-throughput DNA purification platform using perfluorocarbon pods that enabled approximately 200 mg DNA per pod and reduced material costs by about 91 percent. Developed a 3D-printable self-healing DNA–Al^{3+} hydrogel composite for structural repair. Co-authored four publications and co-invented two patents while coordinating cross-disciplinary collaborations across seven research groups.

SKILLS

Molecular & Bioengineering: PCR; qPCR; IVT; Enzymatic assays and workflows; Electrophoresis (PAGE, agarose); DNA/RNA extraction & purification; LSPR-based binding assays; Bio-cleanroom protocols; Liquid Chromatography; UV–Vis spectroscopy (Spectrometer, Nanodrop) ; Fluorometry (Qubit, Plate Reader).

Materials Characterization: SEM; DLS; EDS; Optical microscopy; Rheometry; Universal testing machine; Contact-angle measurement.

Fabrication & Processing: Electrospinning; 3D printing (DIW, SLA, FDM); Spin coating; Mold casting; Photolithography; Two-photon lithography; Etching; Nanopatterning; Freeze-drying; Roll-to-roll processing

Programming & Data/Modeling: Python; Data analysis & visualization (pandas, NumPy, seaborn); Machine learning (TensorFlow, PyTorch - working knowledge); Java; AI (vibe coding, agentic workflows, prompt engineering)

2D/3D Design & Visualization: CAD; SketchUp; Autodesk 3ds Max; Blender; KeyShot; Adobe Illustrator, Photoshop, InDesign; Bootstrap Studio; Scientific figure production; Video/audio editing.

EDUCATION

Cornell University — **Ithaca, NY**

Biological and Environmental Engineering

Concentration: Biological Engineering, Materials Science, Bioenvironmental Engineering

Ph.D. — DNA Materials Lab, Advisor: Dan Luo — Expected May 2026

M.S. — Aug 2024

M.Eng. — May 2020

Hong Kong Baptist University — **Kowloon, Hong Kong**

Chemistry (Major) and Computer Science (Minor)

B.Sc. (Hons) — Microfabrication & Surface Materials Lab, Supervisor: Kangning Ren — Nov 2019

EXPERIENCE

Graduate Research Assistant — **Ithaca, NY**

DNA Materials Lab, Cornell University — Feb 2021 - Present

- **Led development of DNA-barcoded microparticle tracers** for a DoD-funded field deployment across 11 km² of lake, coordinating 4 disciplines and 7 research groups. Achieved qPCR detection 7 km downstream from <1 mg DNA release in a positive-pressure bio-cleanroom (first-author paper, ES&T, 2025).

- **Contributed to a continuous-flow nucleic acid production platform** (2nd author, Nature under review); co-designed and fabricated microfluidic chip reactors, performed all materials characterization (SEM, rheology), and developed a bead-based RNA purification method achieving up to 94% recovery.
- **Invented a high-throughput nucleic acid purification platform** (pod-based, perfluorocarbon medium); delivered ~200 mg DNA per pod and reduced costs by ~91% vs. conventional methods, enabling low-cost purification for downstream qPCR and sequencing workflows.
- **Developed 3D-printable DNA hydrogel composites** with multiple crosslinking modes (thermal, UV-reversible, ionic Al^{3+}), achieving time-programmed shape locking and autonomous structural repair in ceramic tiles; validated as a programmable biomaterials platform for potential drug delivery and tissue scaffold applications (co-first-author paper, ACADIA, 2024).
- **Mentored 3 undergraduate researchers and taught across 7 engineering courses,** including co-instructing a biomaterials course (~50% of content, ~45 students) and integrating AI tools into curriculum. Presented research at ACS Fall 2023 and Belt & Road Youth Forum 2023.

Undergraduate Research Assistant & Senior Research Assistant **Kowloon, Hong Kong**

Hong Kong Baptist University Jun 2017 - Aug 2019 & Oct 2020 - Jan 2021

- **Engineered durable polymer superhydrophobic materials** by replicating nano-micro structures via thermal pressing with master molds from photolithography, two-photon lithography, and etching (3rd-author paper, The Innovation IF 33.2; US Patent 11,839,998).
- **Led an experimental study on static-charge anti-icing,** demonstrating ~25% reduction in droplet contact time. Received the Best Undergraduate Thesis Award.

Research Exchange Trainee **Atlanta, GA**

Georgia State University, Molecular Basis of Disease Program Jun 2018 - Aug 2018

- **Characterized protein–DNA binding kinetics** using LSPR (localized surface plasmon resonance) assays. Measured how transcription factor PU.1 interacts with DNA, providing insights into sequence-specific binding affinities in real time. Received the Best Poster Presentation Award for this work.

PUBLICATIONS

- Wang, D., *Li, Z.*, Li, J., Han, Y., Sun, T., Li, F., Liu, P. "A Chip Reactor for Perpetual Nucleic Acid Production and On-chip Information Processing." Nature, under review (2026).
- *Li, Z.,* Ramón, C. L., Koeberle, A., et al. "Tracing Environmental DNA Transport in Large Lakes with Synthetic DNA Microparticles and Hydrodynamic Modeling" Environmental Science & Technology (IF = 12.4), (2025). DOI
- He, C.*, *Li, Z.*,* Wang, L. X., et al. "*PolyTile 4.0: Self-healing Ceramic Tiles*" ACADIA (2024). DOI
- Li, W., Chan, C. W., *Li, Z.*, et al. "*All-perfluoropolymer, nonlinear stability-assisted monolithic surface combines topology-specific superwettability with ultradurability.*" The Innovation (IF = 33.2), 4(2), 100299, (2023). DOI

PATENTS

- Ren, K., Wu, H., Wang, Z., Yao, S., Ong, B., Li, W., *Li, Z.*, Sun, H., & Chan, C.W. "Crack engineering as a new route for the construction of arbitrary hierarchical architectures." US Patent 11,839,998, (2023).
- Li, Q., *Li, Z.,* & Lin, Z. "Reactor and method of spiral propulsion biomass continuous thermal cracking." Chinese Patent 201711214139.6 (2017).