BIOGRAPHICAL SKETCH

NAME: Shailendra Koirala

eRA COMMONS USER NAME:

POSITION TITLE: Postdoctoral Scholar

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	Completion Date	FIELD OF STUDY
The University of Texas at Dallas, Richardson, TX	Ph.D.	08/2025	Chemistry
Southern Illinois University Edwardsville, IL	M.S	08/2020	Chemistry
Kathmandu University, Nepal	B.Pharm	12/2015	Pharmacy

A. Personal Statement

I am a Ph.D. chemist with expertise in designing, synthesizing, and validating both fluorescent and MRI-active molecular probes for translational imaging. My doctoral research focuses on integrating optical imaging, MRI, and *in vivo* animal models to study intracellular bacterial infections and evaluate novel contrast platforms. My work spans organic synthesis, probe engineering, microbiology, analytical characterization, *in vivo* rodent imaging, and quantitative multimodal fluorescence/MRI workflows.

A major component of my research has centered on fluorescent probe development, including Zn-Oxy-DPA probes capable of selectively staining intracellular uropathogenic bacteria with high sensitivity. In parallel, I expanded this platform into MRI by creating Gd-based probes, organic radical contrast agents, and TMV-based nanomaterials engineered for enhanced relaxivity. Through these efforts, I gained substantial hands-on *in vivo* MRI experience across phantom studies, bacterial samples, and murine models, including optimization of acquisition parameters, contrast behavior, and biodistribution analysis.

To support translational applications, I additionally developed a minimally invasive fiber-optic laser catheter for survival intravesical illumination in mouse models, integrating optical engineering with animal handling, contrast delivery, and imaging-guided validation.

B. Positions, Scientific Appointments, and Honors

Positions and Appointment:

Postdoctoral Scholar
Stanford University, Department of Radiology (Lucas Center) — Nov 2025–Present

Graduate Research Assistant
University of Texas at Dallas — Aug 2024–Aug 2025

Graduate Teaching Assistant
University of Texas at Dallas — Aug 2020–Jul 2024

Graduate Research Assistant
Southern Illinois University Edwardsville — Aug 2019–Jul 2020

Graduate Teaching Assistant

Southern Illinois University Edwardsville — Aug 2018–Jul 2019

Product Manager
Genetica Laboratory Pvt. Ltd., Nepal — Dec 2015–Jul 2018

Pharmaceutical Intern
Deurali-Janata Pharmaceuticals, Nepal — Jul 2015–Nov 2015

Honors:

- **Betty and Gifford Johnson Travel Award** — University of Texas at Dallas (2022)
- **Mei Lein Fellowship** — University of Texas at Dallas (2022)
- **Best International Student Award** — Southern Illinois University Edwardsville (2019)
- **Research Grant for Graduate Student Award** — Southern Illinois University Edwardsville (2019)

C. Contributions to Science

1. Molecular probes for intracellular bacterial imaging and therapy

Developed Zn-Oxy-DPA fluorescent/MRI probes capable of selectively staining and killing intracellular *uropathogenic E. coli (UPEC)*. This work included probe synthesis, structure–activity optimization, imaging quantification, intracellular viability assays, probe validation in mammalian cells, and *in vivo* evaluation.

Key publication:

- **Koirala, Shailendra**, Miguel A. Gaspar, Yalini H. Wijesundara, Dong-Hao Li, Jashkaran G. Gadhvi, Ryanne N. Ehrman, Samuel A. Cornelius et al. "Fluorescent molecular probe for in vivo and in vitro targeting and imaging of an intracellular bacterial infection." *Chemical Science* 16, no. 18 (**2025**): 7902-7911.

2. TMV-based nanomaterials and MRI contrast agents

Engineered tobacco mosaic virus (TMV)–based nanomaterial platforms, including TEMPO-conjugated TMV for MRI and oxidative stress imaging. Work included plant infection, virus purification, bioconjugation, characterization, and functional imaging evaluation.

Key publication:

- Lumata, Jenica L., Laurel M. Hagge, Miguel A. Gaspar, Ikeda Trashi, Ryanne N. Ehrman, **Shailendra Koirala**, Alyssa C. Chiev et al. "TEMPO-conjugated tobacco mosaic virus as a magnetic resonance imaging contrast agent for detection of superoxide production in the inflamed liver." *Journal of Materials Chemistry B* 12, no. 13 (**2024**): 3273-3281.

3. Metal–organic frameworks, biocompatibility, immunology, and adjuvanting materials

Contributed to studies evaluating MOF-based antigen depots and ZIF-8 biocompatibility for controlled release and immunological applications.

Key publications:

- Kumari, Sneha, Thomas S. Howlett, Ryanne N. Ehrman, **Shailendra Koirala**, Orikeda Trashi, Ikeda Trashi, Yalini H. Wijesundara, and Jeremiah J. Gassensmith. "In vivo biocompatibility of ZIF-8 for slow release via intranasal administration." *Chemical Science* 14, no. 21 (**2023**): 5774-5782.
- Ehrman, Ryanne N., Olivia R. Brohlin, Yalini H. Wijesundara, Sneha Kumari, Orikeda Trashi, Thomas S. Howlett, **Shailendra Koirala** et al. "A scalable synthesis of adjuvanting antigen depots based on metal–organic frameworks." *Chemical Science* 15, no. 8 (**2024**): 2731-2744.

4. **Mechanistic and physical organic chemistry: Hydride tunneling & kinetic isotope effects**
   During my M.S. research, I investigated hydride tunneling, donor-acceptor distance, and kinetic isotope effects in NADH/NAD^+ analog systems to elucidate reaction-coordinate dynamics and enzyme-like behavior in solution.

   Key publications:
   - Maness, Peter, **Shailendra Koirala**, Pratichhya Adhikari, Nasim Salimraftar, and Yun Lu. "Substituent Effects on Temperature Dependence of Kinetic Isotope Effects in Hydride-Transfer Reactions of NADH/NAD+ Analogues in Solution: Reaction Center Rigidity Is the Key." *Organic Letters 22*, no. 15 (**2020**): 5963-5967.
   - Bai, Mingxuan, **Shailendra Koirala**, and Yun Lu. "Direct Correlation between Donor-Acceptor Distance and Temperature Dependence of Kinetic Isotope Effects in Hydride-Tunneling Reactions of NADH/NAD+ Analogues." *The Journal of Organic Chemistry* 86, no. 11 (**2021**): 7500-7507.

5. **Translational tools: Fiber-optic laser catheter engineering**
   Designed, fabricated, and validated a minimally invasive fiber-optic laser catheter enabling survival intravesical illumination in mice. This included optics alignment, sterilization workflow, power calibration, device documentation, and animal imaging integration.

D. SCHOLARLY OUTPUT

Peer-Reviewed Publications

- **Koirala, Shailendra**, Miguel A. Gaspar, Yalini H. Wijesundara, Dong-Hao Li, Jashkaran G. Gadhvi, Ryanne N. Ehrman, Samuel A. Cornelius et al. "Fluorescent molecular probe for in vivo and in vitro targeting and imaging of an intracellular bacterial infection." *Chemical Science* 16, no. 18 (**2025**): 7902-7911.
- Maness, Peter, **Shailendra Koirala**, Pratichhya Adhikari, Nasim Salimraftar, and Yun Lu. "Substituent Effects on Temperature Dependence of Kinetic Isotope Effects in Hydride-Transfer Reactions of NADH/NAD+ Analogues in Solution: Reaction Center Rigidity Is the Key." *Organic Letters 22*, no. 15 (**2020**): 5963-5967.
- Bai, Mingxuan, **Shailendra Koirala**, and Yun Lu. "Direct Correlation between Donor-Acceptor Distance and Temperature Dependence of Kinetic Isotope Effects in Hydride-Tunneling Reactions of NADH/NAD+ Analogues." *The Journal of Organic Chemistry* 86, no. 11 (**2021**): 7500-7507.
- Kumari, Sneha, Thomas S. Howlett, Ryanne N. Ehrman, **Shailendra Koirala**, Orikeda Trashi, Ikeda Trashi, Yalini H. Wijesundara, and Jeremiah J. Gassensmith. "In vivo biocompatibility of ZIF-8 for slow release via intranasal administration." *Chemical Science* 14, no. 21 (**2023**): 5774-5782.
- Lumata, Jenica L., Laurel M. Hagge, Miguel A. Gaspar, Ikeda Trashi, Ryanne N. Ehrman, **Shailendra Koirala**, Alyssa C. Chiev et al. "TEMPO-conjugated tobacco mosaic virus as a magnetic resonance imaging contrast agent for detection of superoxide production in the inflamed liver." *Journal of Materials Chemistry B* 12, no. 13 (**2024**): 3273-3281.
- Wijesundara, Yalini H., Fabian C. Herbert, Sneha Kumari, Thomas Howlett, **Shailendra Koirala**, Orikeda Trashi, Ikeda Trashi, Noora M. Al-Kharji, and Jeremiah J. Gassensmith. "Rip it, stitch it, click it: A Chemist's guide to VLP manipulation." *Virology* 577 (**2022**): 105-123.
- Ehrman, Ryanne N., Olivia R. Brohlin, Yalini H. Wijesundara, Sneha Kumari, Orikeda Trashi, Thomas S. Howlett, **Shailendra Koirala** et al. "A scalable synthesis of adjuvanting antigen depots based on metal–organic frameworks." *Chemical Science* 15, no. 8 (**2024**): 2731-2744.
- Odeyemi, Isaiah, Teri A. Douglas, Nosakhare F. Igie, James A. Hargrove, Grace Hamilton, Brianna B. Bradley, Cathy Thai, **Shailendra Koirala** et al. "An optimized purification protocol for enzymatically synthesized S-adenosyl-L-methionine (SAM) for applications in solution state infrared spectroscopic studies." Spectrochimica Acta Part A: *Molecular and Biomolecular Spectroscopy* 309 (**2024**): 123816.

Presentations and Invited Lectures

- Guest Speaker, Southern Illinois University Edwardsville — July 2024
- Invited Oral Presentation, ACS Meeting in Miniature — April 2023
- Poster, UT Dallas–UT Southwestern Imaging Workshop — Oct 2023
- Invited Talk, North American Supramolecular Chemistry Meeting — Dec 2022
- Oral Presentation, ACS DFW Meeting in Miniature — Apr 2022

Peer Review Service

Official Reviewer, Chemical Engineering Journal

E. ADDITIONAL INFORMATION

Mentoring

- Tyler Wilson Carter (BS Chemistry) — 2024–2025
- TQ Nicholas Nguyen (BS Chemistry) — 2022–2024
- Miguel Angel Gaspar (MS Chemistry & Biochemistry) — 2023–2025

Leadership

- Secretary, Nepali Graduate Student Association at UTD — 2022–2025
- Executive Member, Forum of Pharmacy, Kathmandu University
- Class Coordinator, KU Red Cross Society — 2015
