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2024- Present	Professor, Sungkyunkwan University
2022-2023	Postdoctoral Researcher,
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2021-2022	Postdoctoral Researcher,
	Korea Research Institute of Bioscience and Biotechnology (KRIBB),
2021 PhD	Korea Advanced Institute of Science and Technology (KAIST)
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Research Interests:

Bio-Nano Sensor, Diagnosis, Liquid biopsy, Nucleic acid-based biotechnology, CRISPR system

Selected Publications:

1. **Song, J.**, Cho, M.H., Cho, H. et al. Amplifying mutational profiling of extracellular vesicle mRNA with SCOPE. ***Nature Biotechnology***, 2024.

2. Lee, J. C. †, Kim, S. Y. †, **Song, J.** †, Jang, H., Kim, M., Kim, H., ... & Ingber, D. E. Micrometer-thick and porous nanocomposite coating for electrochemical sensors with exceptional antifouling and electroconducting properties. ***Nature Communications***, 2024, 15(1), 711.

3. Jang, H., **Song, J.**, Kim, S., Byun, J. H., Lee, K. G., Park, K. H., ... & Kang, T. ANCA: artificial nucleic acid circuit with argonaute protein for one-step isothermal detection of antibiotic-resistant bacteria. ***Nature Communications***, 2023, 14(1), 8033.

4. **Song, J.**, Song, Y., Jang, H., Moon, J., Kang, H., Huh, Y. M., ... & Kang, T. Elution-free DNA detection using CRISPR/Cas9-mediated light-up aptamer transcription: Toward all-in-one DNA purification and detection tube. ***Biosensors and Bioelectronics***, 2023, 225, 115085.

5. **Song, J.**, Cha, B., Moon, J., Jang, H., Kim, S., Jang, J., ... & Kang, T. Smartphone-based SARS-CoV-2 and variants detection system using colorimetric DNAzyme reaction triggered by loop-mediated isothermal amplification (LAMP) with clustered regularly interspaced short palindromic repeats (CRISPR). ***ACS nano***, 2022, 16(7), 11300-11314.

Mutational profiling of extracellular vesicle with CRISPR technology

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Abstract

Extracellular vesicles (EVs) in liquid biopsies contain messenger RNA (mRNA), which can be sequenced to reveal clinical information on somatic mutations, resistance profiles, and tumor recurrence. However, because EV mRNA is rare in liquid biopsies and requires large sample volumes or specific procedures for analysis, it is still underutilized. We now present Self-amplified and CRISPR-aided Operation to Profile EVs (SCOPE), a platform for EV mRNA detection. Using CRISPR-mediated target RNA recognition via Cas13, SCOPE enables sub-attomolar detection limit and single-nucleotide resolution in signal amplification and replication. We created probes for important mutations in the KRAS, BRAF, EGFR, and IDH1 genes as proof of concept, improved single-pot assay procedures, and put in place an automated multi-sample detection tool. We verified that SCOPE can identify lung cancer in its early stages in animal models, tracked the tumor mutational load in colorectal cancer patients, and categorized glioblastoma patients. By speeding up readouts, SCOPE can enhance the clinical application of EVs in precision oncology.

1. **Song, J.**, Cho, M.H., Cho, H. et al. Amplifying mutational profiling of extracellular vesicle mRNA with SCOPE. ***Nature Biotechnology***, 2024.