Jong Bum Lee, Professor
Department of Chemical Engineerin,
University of Seoul, Seoul, South Korea
Tel: +82-2-6490-2372; Fax: +82-2-6490-2364;
Email: jblee@uos.ac.kr

2011- Present	Professor, University of Seoul
2010-2011	Postdoctoral Researcher, MIT, Cambridge, USA
2009-2010	Postdoctoral Researcher, Cornell University, Ithaca, USA
2009 PhD	Cornell University, USA
2007 MS	Cornell University, USA
2002 BS	Sogang University

Research Interests:
DNA/RNA nanotechnology, Drug Delivery, Molecular Sensing;

Selected Publications:

1. Y. Ji, T. Kim, D. H. Han, and **J. B. Lee**, Self-Healing and Thermal Responsive DNA Bioplastics for On-Demand Degradable Medical Devices, ***ACS Materials Letters***, 6, 4, 1277-1287 (**2024**)
2. D. Kim, S. Kim, J. Jeong, S. Han, H. Kim, S. Lee, I. Choi, J. Hong, J. Jin, and **J. B. Lee**, Multimodal Golden DNA Superstructures (GDSs) for Highly Efficient Photothermal Immunotherapy, ***ACS Nano***, 18, 2, 1744-1755. (**2024**)
3. H. Nam, T. Kim, S.Moon, Y. Ji, and J. B. Lee, Self-Assembly of a Multimeric Genomic Hydrogel via Multi-Primed Chain Reaction of Dual Single-Stranded Circular Plasmids for Cell-Free Protein Production, ***iScience,*** 26, 107089 (**2023**)
4. H. Jeon*, Y. Min Kim*, S. Han, H. C. Moon, J. B. Lee, DNA Optoelectronics: Versatile Systems for On-Demand Functional Electrochemical Applications, ***ACS Nano***, 16, 241-250 (**2022**)
5. J. S. Lee, H. Kim, C. Jo, J. Jeong, J. Ko, S. Han, M. S. Lee, H. Lee, J. W. Han, J. Lee and J. B. Lee, Enzyme-driven Hasselback-like DNA-based Inorganic Superstructures, ***Advanced Functional Materials***, 27, 1704213 (**2017**)

DNA Supramolecular Structures: Innovating Across Medicine and Electronics

Jong Bum Lee

Department of Chemical Engineering, University of Seoul, Seoul, Republic of Korea

Abstract

In this talk, I will explore the forefront of DNA-based technologies and their interconnected applications in creating advanced materials and therapeutic solutions. I will cover several applications of DNA that illustrate its versatility and synergistic potential in various scientific and medical fields.

First, I will introduce the development of multimodal golden DNA superstructures for highly efficient photothermal immunotherapy. This innovative approach leverages the unique properties of DNA-gold nanocomposites to enhance photothermal therapy, offering a promising strategy for targeted cancer treatment with minimal side effects. This application ties into the broader context of utilizing DNA's multifunctional capabilities to create advanced therapeutic solutions, seamlessly linking back to our discussions on regenerative medicine and optoelectronics.

Then, I will discuss the development of an injectable cellular DNA-based hydrogel, assembled via clickable cells and nucleic acid scaffolds. This hydrogel offers a unique approach to regenerative therapy by providing a biocompatible extracellular matrix that supports cell-to-cell communication and retention at target sites, facilitating tissue repair and healing.

Building upon this foundation of DNA's structural versatility, we transition to the realm of DNA optoelectronics. This research shows the integration of DNA-based gels with optoelectronic properties, demonstrating how DNA can be used to develop electrochromic devices, highlighting its role in creating smart, responsive materials.

In summary, this talk aims to highlight the transformative potential of DNA-based technologies in creating interconnected and multifunctional materials for a wide range of applications. From regenerative medicine and optoelectronics to bioplastics and cancer therapy, we explore the cutting-edge advancements that are shaping the future of DNA research.