

Yoo Kyung Kang, DVM, Ph.D.

Assistant Professor

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EDUCATION & LICENSE

- Mar. 2014 ~ Feb. 2020. **Korea Advanced Institute of Science and Technology (KAIST), Ph.D.**
Department of Biological Sciences
Master-Doctorate joint program
Title of Ph.D thesis:
“Nano- and micro-scale polymeric conjugate systems for editing and detection of gene targets”
Advisor: Prof. Hyun Jung Chung
Department of Biological Sciences, Graduate School of Nanoscience and Technology, KAIST
- Feb. 2014 **Doctor of Veterinary Medicine (D.V.M.)**
- Mar. 2006 ~ Feb. 2014 **Chungnam National University, Korea**
College of Veterinary Medicine
The Doctor of Veterinary Medicine (D.V.M) degree program

EMPLOYMENT HISTORY

College of Pharmacy, Gyeongsang National University, South Korea

From 01/09/2022 - present

Position title: Assistant Professor

Department of Materials, Imperial College London, UK From 21/09/2020 - 19/08/2022

Position title: Sponsored researcher/ Research associate

Brief description of duties: Development of non-invasive CRISPR ribonucleoprotein delivery platform using biomaterials for *ex vivo* gene therapy.

Korea Advanced Institute of Science and Technology From 01/03/2020 - 31/08/2020

Position title: Postdoctoral Researcher

Brief description of duties: Development of enhanced delivery system of CRISPR for gene editing and cancer immunotherapy

PUBLICATIONS

H. Lee, J. Lee, **Y. K. Kang**, J. H. Lee, S. Yang, H. J. Chung, “A Lateral Flow Assay for Nucleic Acid Detection Based on Rolling Circle Amplification Using Capture Ligand-Modified Oligonucleotides.” *Biochip journal*, 1- 10 (2022).

J. Lee, **Y. K. Kang**, E. Oh, J. Jeong, S. H. Im, D. K. Kim, H. Lee, S. Kim, K. Jung, H. J. Chung “Nano-assembly of a Chemically Tailored Cas9 Ribonucleoprotein for *In Vivo* Gene Editing and Cancer Immunotherapy.” *Chemistry of Materials*, 34, 2, 547–561 (2021). **(Co-first author, Front cover in the issue)**

Y. K. Kang, J. H. Lee, S. H. Im, J. H. Lee, J. Jeong, D. K. Kim, S.Y. Yang, K. Jung, S. Kim, H. J. Chung, “Cas9 Conjugate Complex Delivering Donor DNA for Efficient Gene Editing by Homology-Directed Repair.” *Journal of Industrial and Engineering Chemistry*, 102, 241-250 (2021). **(First author)**

J. H. Lee, J. S. Ryu, **Y. K. Kang**, H. Lee, H. J. Chung, “Polydopamine Sensors of Bacterial Hypoxia via Fluorescence Coupling.” *Advanced Functional Materials*, 31,9, 2007993 (2021). **(Front cover in the issue)**

Y. K. Kang, S. H. Im, J. S. Ryu, J. Lee, H. J. Chung, “Simple Visualized Readout of Suppressed Coffee Ring Patterns for Rapid and Isothermal Genetic Testing of Antibacterial Resistance.” *Biosensors and Bioelectronics*, 168, 112566 (2020). **(First author)**

J. S. Ryu, S. H. Im, **Y. K. Kang**, Y. S. Kim, H. J. Chung, “Ultra-Fast and Universal Detection of Gram-Negative Bacteria in Complex Samples Based on Colistin Derivatives.” *Biomaterials Science*, 8, 2111-2119 (2020). **(Front cover in the issue)**

Y. K. Kang, K. Kwon, J. S. Ryu, H. N. Lee, C. Park, H. J. Chung, “Nonviral Genome Editing Based on a Polymer-Derivatized CRISPR Nanocomplex for Targeting Bacterial Pathogens and Antibiotic Resistance.” *Bioconjugate Chemistry* 28, 957–967 (2017). **(First author)**

E.H. Park, J. Yum, K.B. Ku, H.M. Kim, Y.M. Kang, J.C. Kim, J.A. Kim, **Y.K. Kang**, S.H. Seo “Red Ginseng-containing diet helps to protect mice and ferrets from the lethal infection by highly pathogenic H5N1 influenza virus.” *Journal of ginseng research*, 38(1), 40-46 (2014).

CONFERENCES PRESENTATION

Y. K. Kang, H. J. Chung, MRS Fall Meeting, USA (2019). “Polymer-derivatized Cas9 conjugates as a nonviral genome editing system for therapeutic applications of CRISPR”

H. J. Chung, **Y. K. Kang**, MRS Fall Meeting, USA (2019). “Engineering the Cas9 protein via a chemical route for nonviral delivery”

Y. K. Kang, S. H. Im, H. J. Chung, The Korean Society of Biomaterials, Korea (2019). “Simple molecular detection of bacteria and antibiotic resistance by coffee ring assay”

Y. K. Kang, S. H. Im, H. J. Chung, The Korean Society of Industrial and Engineering Chemistry, Korea (2019). “Coffee ring assay for detection of isothermally amplified nucleic acid targets from multidrug-resistant bacteria”

Y. K. Kang, S. H. Im, H. J. Chung, The Korean Society of Industrial and Engineering Chemistry, Korea (2018). “Easy detection of multidrug-resistant bacteria by isothermal amplification mediated coffee ring assay”

Y. K. Kang, H. J. Chung, 253rd ACS National Meeting, USA (2017). “Nonviral genome editing based on a CRISPR nanocomplex for target-specific treatment of multidrug-resistant bacterial infections”

Y. K. Kang, S. H. Im, H. J. Chung, KGPF Annual Conference, Korea (2017). “Development of polymer-derivatized CRISPR complex for targeting infectious disease”

Y. K. Kang, S. H. Im, H. J. Chung, The Korean Society of Industrial and Engineering Chemistry, Korea (2017). Nonviral genome editing CRISPR nanocomplexes for targeting bacterial infections”

Y. K. Kang, H. J. Chung, The Korean Society of Industrial and Engineering Chemistry, Korea (2017). “A microbead-DNA assay based on the coffee ring effect for detection of multidrug-resistant bacteria”

Y. K. Kang, H. J. Chung, The Korean Society of Biomaterials, Korea (2017). “Nonviral genome editing based on a polymer-derivatized CRISPR nanocomplex for targeting bacterial pathogens and antibiotic resistance”

Y. K. Kang, H. J. Chung, MRS Fall Meeting, USA (2016). “Nonviral Genome Editing Based on a CRISPR Nanocomplex System for Target-Specific Treatment of Multidrug-Resistant Bacterial Infections”

Y. K. Kang, H. J. Chung, Korean Society of Industrial and Engineering Chemistry, Korea (2016). “Nonviral genome editing based on a polymer-derivatized CRISPR nanocomplex for targeting multidrug-resistant bacteria”

Y. K. Kang, H. J. Chung, The Polymer Society of Korea, Korea (2015). “Detecting antimicrobial resistance by rapid nano-particle sensing for diagnosing infections”

AWARDS AND HONORS

- 2020 Postdoctoral Fellowship Program (Nurturing Next-generation Researchers),
National Research Foundation of Korea
- 2019 Best Poster Award, 2019 Spring Conference, The Korean Society for Biomaterials
- 2017 Global Ph.D. Fellowship Poster Presentation Award, National Research Foundation of Korea
- 2016 Best Poster Award, 2016 Fall Conference, The Korean Society of Industrial and Engineering Chemistry
- 2015 Award at Venture Research Program for Graduate and PhD students: ~26,000 USD
“Modified CRISPR based target specific treatment for bacterial infection”
- 2014 ~ 2018 Global Ph.D. Fellowship, National Research Foundation of Korea
(Project number: 2014H1A2A1019986 / ~130,000 USD for 5 years)
“Development of Molecularly Targeted Nanoparticle Systems for Screening, Diagnosis,
and Treatment of Microbial Infections”
- 2014 ~ 2019 Scholarship funded by KAIST (~36,000 USD in total)

PATENTS

1. Y. K. Kang, H. J. Chung, “Nonviral genome editing CRISPR nanocomplex and fabrication method thereof”
(Registered, Korea, Australia 2021)
Korea - Application No. 10-2017-0075053
PCT - Application No. PCT/KR2017/013623
United States of America - Application No. 16068161
Australia - Application No. 2017390080
Canada - Application No. 3,009,389
2. Y. K. Kang, S. H. Im, H. J. Chung, “Lipid conjugated genome editing protein-based CRISPR complex and fabrication method thereof” (Pending)
Korea - Application No. 10-2019-0129452
3. Y. K. Kang, H. J. Chung, “Composition for detection of target nucleic acid based on isothermal amplification and coffee ring effect, and detection method thereof” (Pending)
Korea - Application No. 10-2021-0021858

PRESS RELEASE

- “Visualized molecular detection of bacteria and antibiotic resistance by coffee ring assay for point of care diagnostics” (Sep. 17th, 2019)
<https://www.chosun.com/economy/science/2020/09/16/6KECXGXWYZETFKDLENQMCCCQQ/>
<http://www.lecturernews.com/news/articleView.html?idxno=52101>
<https://news.naver.com/main/read.nhn?oid=022&aid=0003504128>
- “Polymer derivatized CRISPR for multidrug resistant bacterial infection” (Apr. 1st, 2019)
http://www.yakup.com/news/index.html?mode=view&pmode=&cat=&cat2=&nid=228644&num_start=0&csearch_word=%EC%B9%B4%EC%9D%B4%EC%8A%A4%ED%8A%B8&csearch_type=&cs_scope=

- “CRISPR genome editing for target-specific treatment of multidrug-resistant bacterial infections”, News on KAIST Compass for Natural and Life Sciences (Oct. 23th, 2017)
<http://kaistcompass.kaist.ac.kr/?s=Chung&slid=1935>

MAJOR TECHNICAL SKILLS

- Nucleic acids handling and techniques: DNA, RNP preparation (gDNA, mRNA extraction from clinical samples, or cultured bacterial cells and mammalian cells, cDNA synthesis), Sequence and primer design, Amplification (qPCR, PCR, Isothermal PCR), Quantification, Enzyme reaction, Gel electrophoresis, Sequencing (Next-generation sequencing (NGS), Sanger sequencing etc.)
- Data analysis of various material characterization techniques: Transmission Electron Microscopy (TEM), Scanning electron microscopy (SEM), Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS), Atomic Force Microscopy (AFM), Infrared spectroscopy (IR), Dynamic Light Scattering (DLS) and Zeta Potential, Fluorescence spectroscopy etc.
- Nanoparticle synthesis, Surface functionalization and fabrication, Bio-conjugation using cross linker
- Cell culture and bioimaging/analysis techniques: Cancer cell line, Primary cell culture and maintenance, Cell treatment and transfection, Isolation of primary cells from mice (hepatocytes, hepatic stellate cells, kupffer cells, bone marrow stromal cells (BMSCs) etc.), Flow cytometry, Fluorescence-activated Cell Sorting (FACS), Confocal microscopy etc.
- Protein expression and purification; Transformation, Cloning, Bacterial culture, Fast protein liquid chromatography (FPLC)
- Molecular work: Western, ELISA, Immunohistochemistry (IHC)
- Design and analysis of CRISPR–Cas experiments : Design and synthesis of sgRNA, Analysis of genome editing.
- Animal experiments: Surgery and injection (IV, IP, IM, intravitreal etc.) Histological analysis of organ and tissue, Tumor xenograft, In Vivo Imaging System (IVIS) evaluation.
- Data analysis of various material characterization techniques: Prism, Origin, ZEN (confocal fluorescence microscopy), Flowjo (Flow cytometry), XEI(AFM), ImageJ etc.
- Statistical multivariate analysis: Principal component analysis, Discrimination analysis

MEMBERSHIPS

Member of the Korean Society of Pharmaceutical Sciences and Technology 2022

Member of the Korean Society of Industrial and Engineering Chemistry, 2014

Member of the Korean Society for Biomaterials, 2014

Member of Korean Veterinary Medical Association, KVMA, 2014