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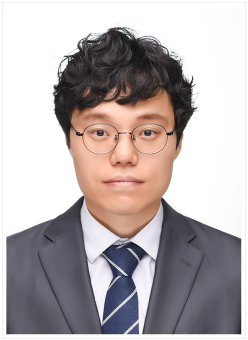

2021-Present	Assistant Professor, POSTECH, Pohang, Rep. of Korea
2016-2021	Postdoctoral Researcher, Northwestern University, Evanston, USA
2015 PhD	University of Oxford, UK
2008 MS	KAIST, Rep. of Korea
2006 BS	Yonsei University, Rep. of Korea

Research Interests:

Ribosome, cell-free protein expression, genetic-code reprogramming, pharmacophore.

Selected Publications:

1. J. Lee, J. N. Coronado, N. Cho, J. Lim, B. M. Hosford, S. Seo, D. S. Kim, C. Kofman, J. S. Moore, A. D. Ellington, E. V. Anslyn, M. C. Jewett, Ribosome-mediated biosynthesis of pyridazinone oligomers in vitro, *Nat. Commun*. 2022, 13, 6322.

2. J. Lee, K. J. Schwarz, D. S. Kim, J. S. Moore, M. C. Jewett, Ribosome-mediated incorporation of long-carbon chain and cyclic amino acids into peptides in vitro, *Nat. Commun.* 2020, 11, 4304.

3. J. Lee, K. E. Schwieter, A. M. Watkins, D. S. Kim, H. Yu, K. J. Schwarz, J. Lim, J. Coronado, M. Byrom, E. V. Anslyn, A. D. Ellington, J. S. Moore, M. C. Jewett, Expanding the limits of the second genetic code with ribozymes, *Nat. Commun*. 2019, 10, 5097.

4. J. Lee, A. J. Boersma, M. A. Boudreau, S. Cheley, O. Daltrop, J. Li, H. Tamagaki, H. Bayley, Semisynthetic nanoreactor for reversible single-molecule covalent chemistry. *ACS Nano* 2016, 10, 8843

5. J. Lee, H. Bayley, Semisynthetic protein nanoreactor for single-molecule chemistry. *Proc. Natl. Acad. Sci. U.S.A.* 2015, 112, 13768

Expanded ribosomal synthesis of non-standard cyclic backbones in vitro

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Abstract

The ribosome polymerizes L-α-amino acids into polypeptides, catalyzing peptide bond formation through aminolysis. This process is facilitated by entropy trapping within its peptidyl transferase center (PTC). Based on our previous results published last year, which showed that the ribosome forms 6-membered pyridazinone backbones rather than traditional peptide bonds, we further investigated its ability to create more diverse cyclic backbones during polymerization.

To explore this, we designed a new set of various non-canonical monomers, charged them onto tRNA using ribozymes, and demonstrated that these monomers produce novel cyclic backbones through two consecutive chemical reactions within the ribosome. Furthermore, we examined the regioselectivity of these cyclic backbones, revealing that the ribosome favors the α-nitrogen for covalent bond formation as it incorporates α-amino acids as building blocks within the cell.