

# SYNTHETIC BIOLOGY SEMINAR



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# *MICROBIAL SYNTHETIC BIOLOGY*

The growing interest in the bio-based industry as an alternative production route has given rise to numerous efforts to redesign existing biological systems or synthesize new ones. Imagined to build a system, we require various molecular parts/tools and also need insights on assembling the subset or entire biological systems to exhibit specific functions. The former can be achieved by “Synthetic Biology” approach (bottom-up), and the latter can be achieved by “Systems Biology” approach (top-down). Coordinating these two approaches is mandatory to achieve goals effectively. In this talk, I will describe recent efforts to develop synthetic biology tools such as synthetic protein quality control (ProQC) system, biosensor-based adaptive laboratory evolution (ALE) system, and others. Furthermore, their applications in designing and optimizing synthetic cell factories, including newly isolated fast-growing *Vibrio* sp. dhg to convert marine biomass will be described.

### References:

Biotechnol. Biofuels Bioprod. 15(1):58 (2022)  
Cell Rep. 36(8): 109589 (2021)  
Nat. Chem. Biol. 17:421-427 (2021)  
Nat. Commun. 10:2486 (2019)

**BIO:** SangWoo Seo is an Associate Professor in the School of Chemical and Biological Engineering at Seoul National University (SNU), South Korea. He earned a B.S. in Chemical Engineering from POSTECH (Pohang University of Science and Technology) in 2007 and a Ph.D. in Chemical Engineering from POSTECH in 2012, where he worked with Prof. Gyoo Yeol Jung to develop synthetic biology tools in *E. coli*. He was a postdoctoral scholar in the Department of Bioengineering at UCSD (Prof. Bernhard Palsson’s lab), where he applied multi-omics analyses to reconstruct transcriptional regulatory networks in *E. coli*. At SNU, his research group focuses on i) elucidation of complex regulatory networks in microorganisms by using next-generation sequencing (NGS) based multi-omics analyses, ii) development of novel synthetic biology tools, and iii) redesigning microorganisms for the production of chemicals, fuels, food additives, pharmaceuticals, and therapeutics, for environmental bioremediation, and for biomedical applications. Several microorganisms such as *E. coli* (including Nissle 1917), *Vibrio natriegens*, *Corynebacterium glutamicum*, *Bacillus megaterium*, Methanotrophs, *Lactobacillus*, *Saccharomyces cerevisiae*, *Yarrowia lipolytica*, and *Pichia pastoris* are used as host systems.