SynCTI Research Meeting

DATE : Thursday, 30 March 2017

TIME : 4.30 pm

LOCATION : CeLS Seminar Room 2

Lee Na Rae

Research Fellow

Title:

Introduction of *in silico* metabolic model and its application for synthetic biology

Abstract:

Metabolic engineering is a commonly used tool to enhance production of value-added compounds in microorganisms and yeasts by customizing their intrinsic metabolic capabilities, i.e., inserting, deleting, up- and /or down-regulation genes, simultaneously. The recent evolution of computational modelling techniques and high-throughput –omics techniques such as genomes, transcriptomes, proteomes, metabolomes and fluxomes encourages the design of microbial cell factories systematically. For that, I developed and modified *in silico* genome-scale metabolic models of interesting microbes and yeasts. Furthermore, characterizing of each organisms and identifying engineering targets to enhance productivity of value-added products were conducted using developed *in silico* genome-scale metabolic models.

Jayaraman Premkumar

Research Fellow

Title:

Optogenetic control of gene expression in bacteria

Abstract:

Programming bacteria the ability to perform precise spatiotemporal control of gene expression is of great importance to improve our understanding on how cellular pathways function and could prove useful in biotechnological applications. Optogenetic systems offer simple and effective tools for this purpose, enabling unprecedented new ways to control cellular behavior in precise spatial and temporal resolution. In line with this, I have engineered a novel bidirectional promoter system for *Escherichia coli* that can be induced or repressed rapidly and reversibly using the blue light dependent DNA-binding protein EL222. In addition, the light-inducible and repressible system can function in parallel with high spatial precision in a single cell and can be switched stably between ON- and OFF-states by repetitive pulses of blue light. Furthermore, I have also constructed and characterized a toolbox of synthetic blue-light controllable chimeric promoters to precisely tune gene expression in *E. coli*. Overall, this modular approach layers a transformative platform for next-generation light-controllable synthetic biology systems in prokaryotes.