SynCTI Research Meeting

DATE : Thursday, 25 May 2017

TIME : 4.30 pm

LOCATION : CeLS Seminar Room 2

Zhang Lei

Research Fellow

Title:

Propane-producing *E. coli* strain and alkane-monitoring biosensor

Abstract:

Short-chain alkane propane has widespread applications owning to its excellent features such as higher energy density, cleaner combustion, less greenhouse gas emission, and fine compatibility. Hence, producing renewable propane from microbial platforms attracts increasing concerns from academia and industrial community. We constructed a new biosynthetic pathway for propane production by assembling the engineered valine pathway of *E. coli* and cyanobacterial aldehyde-deformylating oxygenase (ADO). The propane pathway can produce abundant isobutyraldehyde and overcomes the low availability of precursor in propane production. After improving the activity of ADO (*Prochlorococcus marinus* MIT 9313_PMT1231) via rational design, we increased the propane productivity by three times. We also developed a fluorescent biosensor for rapid and *in situ* monitoring of alkane synthesis in *E. coli* and carried out several rounds of directed evolution on ADO (*Synechococcus elongates* PCC7942_orf1593).

Saravanan Prabhu Nadarajan

Research Fellow

Title:

Beyond the 20 natural amino acids: Protein engineering with expanded set of building blocks

Abstract:

Traditional protein engineering relies on substituting the amino acids protein sequence with 20 natural amino acids to alter and improve the structural and functional properties. Although, the conventional protein engineering approaches yield reliable results but this approach is limited with the available 20 natural amino acids Unnatural amino acid incorporation is a recent trending technique that alter and enhances the structural and functional properties of protein using expanded set of building blocks. Residue-specific and site-specific incorporation are the two in vivo approach for the incorporation of unnatural amino acid into the target protein. Residue-specific incorporation approach allows incorporation of unnatural amino acid at multiple site thereby enable synergistic effects to the protein function. Residue specific Incorporation of a metal chelating unnatural amino acid (L-DOPA) enabled a fluorescent based metal sensor with bioconjugation property. This strategy helps to probe the crucial role of specific amino acids at specific site. On the other hand, multisite incorporation of fluorine atom containing unnatural amino acid (Fluoroproline/Fluoro tyrosine) enhances the biophysical properties such as stability and folding. This unique method serve as a tool box to evolve and engineer proteins with novel functional properties. It open new door in protein engineering.