Description:
The future of industrial biotechnology requires efficient development of highly productive and robust strains of microorganisms. Present praxis of strain development cannot adequately fulfill this requirement, primarily owing to the inability to precisely control reactions at a molecular level or to reliably predict the behavior of cells upon perturbation. This project aims to combine the latest advances of structural biology and synthetic biology to provide new tools to precisely design and assemble controllable elements (e.g., enzymes) and modules (pathways) for re-programming cellular metabolism (Fig. 1).

Within this novel approach, we are developing new computational and experimental approaches to targeted reengineering the enzyme allostery, enzyme/coenzyme specificity, novel genetic circuit, etc. from atomic level. These predictively designed modules are combined together to produce a minimally mutated industrial strain for amino acid (e.g., lysine) production with high production rate and yield (Fig. 2).

References

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