

**Primer:** Metabolic engineering strategies repeat across target molecules

**ModCell2:** Multi-objective optimization formulation to design Pareto optimal chassis and modules

**ModCell2-HPC:** Design chassis for hundreds of endogenous products providing general principles for synthetic and natural modular design

**MODCELL:** Design strains for individual products and find common manipulations

**ModCell2-MILP:** Identify optimal solutions to design universal chassis and define key metabolic interfaces

Modular design principles in metabolic engineering for efficient and robust systems