

**Redesigning *Escherichia coli* metabolism for obligate anaerobic
production of biofuels and biochemicals**

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Relevant hosts such as *Escherichia coli* are commonly engineered and optimized to produce target products with different genetic modifications. An engineered host that is optimized to produce one target product may not be suitable to function as a host to efficiently produce other target compounds. To address this bottleneck, we have applied the metabolic pathway analysis tool based on elementary mode analysis to design an optimal modular cell that can metabolically couple with a diverse class of chemicals- and biofuels-producing pathways as exchangeable and tunable modules to efficiently produce a diverse set of chemicals and biofuels at high yields, titers, and productivities. We will present the design, construction, and characterization of an optimal modular cell that can couple with different types of exchangeable and tunable modules to produce short-chain length (<C6) alcohols and a diverse spectrum of their derived esters under anaerobic conditions.