

ENGINEERING ENZYMES, PATHWAYS, AND MICROBES THROUGH THE USE OF AN AUTOMATED ORGANISM ENGINEERING FOUNDRY

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Ginkgo Bioworks is an organism engineering company that applies high-throughput approaches to engineer enzymes and pathways in a variety of hosts. The process of engineering microbes is conducted within our custom-built foundries, which leverage proprietary enzyme sourcing and DNA design software, high volume DNA synthesis, next-generation sequencing, metabolomics, High Resolution Accurate Mass LC-MS, proteomics, and automated bioprocess development to rapidly develop and screen prototype enzymes and strains. Foundry processes are heavily automated and are tracked within Ginkgo's custom software, to permit simultaneous handling of thousands of samples and strains across a single experiment. In most cases, the resulting engineered strains are then cultured to produce chemicals and ingredients of interest via fermentation. In this talk, we will describe how the foundry model can be applied to optimize the production of multiple high value and distinct chemicals. Specifically, we will provide examples of how the foundry can be utilized to engineer not only single enzymes, but pathways as well within the context of distinct hosts. These examples will illustrate how foundry-scale approaches can be harnessed to overcome challenges inherent to biological engineering across a variety of enzyme classes.