Metabolite profiling of microfluidic cell culture conditions for droplet based screening - DTU Orbit (08/11/2017)

Metabolite profiling of microfluidic cell culture conditions for droplet based screening

We investigate the impact of droplet culture conditions on cell metabolic state by determining key metabolite concentrations in S. cerevisiae cultures in different microfluidic droplet culture formats. Control of culture conditions is critical for single cell/clone screening in droplets, such as directed evolution of yeast, as cell metabolic state directly affects production yields from cell factories. Here, we analyze glucose, pyruvate, ethanol, and glycerol, central metabolites in yeast glucose dissimilation to establish culture formats for screening of respiring as well as fermenting yeast. Metabolite profiling provides a more nuanced estimate of cell state compared to proliferation studies alone. We show that the choice of droplet incubation format impacts cell proliferation and metabolite production. The standard syringe incubation of droplets exhibited metabolite profiles similar to oxygen limited cultures, whereas the metabolite profiles of cells cultured in the alternative wide tube droplet incubation format resemble those from aerobic culture. Furthermore, we demonstrate retained droplet stability and size in the new better oxygenated droplet incubation format.

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