Biobutanol production from a Saccharomyces cerevisiae

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Biobutanol represents a second generation biofuel, which can be produced naturally by a number of microorganisms. This alcohol has a number of significant advantages over bioethanol in terms of its physical properties as a fuel, but production systems suffer from various drawbacks. Therefore, we sought to transplant an entire butanol production pathway (the ABE pathway) into a *Saccharomyces cerevisiae* strain. However, this pathway was incapable of generating reasonable yields of butanol without further metabolic alteration to channel carbon towards the substrate of butanol production, acetyl CoA. For instance, the major alcohol dehydrogenase, *ADH1*, was deleted and two enzymes involved in acetyl-CoA biosynthesis were overexpressed to give strains capable of producing 300 mg/L butanol. Surprisingly, deletion of the *ADH1* gene alone is sufficient to produce 40 mg/L butanol from an endogenous pathway. Previously, this endogenous butanol production pathway was characterized and proposed to derive from the mitochondrial catabolism of threonine via multiple leucine biosynthetic genes and the conversion of 2-ketovalerate to butanol. Therefore, the endogenous butanol production pathway is characterized further and we suggest that the endogenous route for butanol synthesis does not use the pathway previously proposed via Leucine metabolic enzymes. This work therefore makes use of synthetic biology and metabolic engineering to effectively set the scene for an initiative towards higher yields of butanol in yeast via concerted interventions in both the endogenous and exogenous pathways.

Biography

Reem Swidah is a Post-doc in the MIB at the University of Manchester. She did her PhD in Prof. Chris Grant and Prof. Mark Ashe labs at the University of Manchester and she Has worked on engineering Saccharomyces cerevisiae strain toward biofuel production. Currently, she is working in Prof. Patrick Cai lab and she is constructing and characterizing the new essential chromosome 3 and Synthetic Genomic Evolution (SCRaMBLE) in yeast. She has extensive experience in metabolic engineering, synthetic Biology and synthetic genome. She has more than 6 years of experience in biofuel production. She has published two articles in the high impact factor journals. She also has proven success in getting funding from the BBSRC and R2I grant, and she has experience leading teams to achieve the objectives of projects. She is also interested in business growth and in making business-to-business partnerships work.

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