

## DESIGNER RHAMNOLIPID PRODUCTION

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Rhamnolipids are biosurfactants featuring surface-active properties that render them suitable for a broad range of applications, e.g., in detergents, food, bioremediation, medicine/pharmacology, and crop science. These properties include their emulsification and foaming capacities and their ability to lower the surface tension. Further, aspects like biocompatibility and environmental friendliness, both features of rhamnolipids [1] are becoming increasingly important. Rhamnolipids thus constitute suitable substitutes for synthetic surfactants produced from fossil resources. Native producers of rhamnolipids are mainly pathogenic bacteria like *Pseudomonas aeruginosa*. We previously designed and constructed a recombinant *Pseudomonas putida* KT2440, which synthesizes rhamnolipids by decoupling production from host-intrinsic regulations and cell growth [2]. As most biosurfactants, rhamnolipids are synthesized in mixtures. We here show our approach to alter the native mixture of surfactant molecules to produce specific new-to-nature combinations. The molecular structure (Figure 1) can on the one hand be altered in the hydrophilic moiety by changing the number of rhamnose molecules. We achieved this by using only distinct genes from the native rhamnolipid synthesis pathway. On the other hand, we were also able to change the length of the fatty acids in the hydrophobic part. This chain length is determined by the acyl-transferase (RhlA). Using *rhlA* genes from different organisms enables our microbial cell factory to synthesize molecules with different chain lengths [3]. The different molecular structures have further been shown to feature diverse physico-chemical properties [4]. Exploiting the natural structural diversity will thus allow for the synthesis of designer rhamnolipids tailor-made for specific applications. We thus present a novel approach to use biochemical engineering to create tailor-made products for a more sustainable future.

References

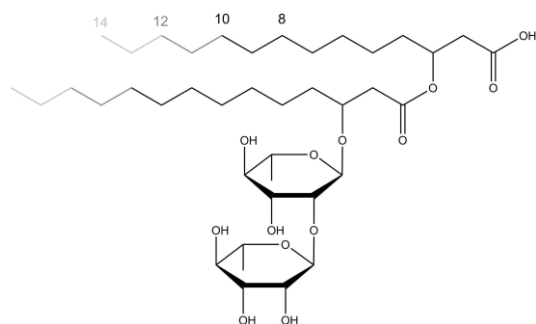


Figure 1 – Molecular structure of rhamnolipids

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