Establishing a Synthetic Pathway for Production of Biodiesel (Fatty Acid Ethyl Esters) in Oleginous Microbial Strain

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Biodiesel is one of promising alternative fossil based diesel fuels. Fatty acids in triacylglycerol (TAG) are used to produce fatty acid methyl esters (FAMEs) and fatty acid ethyl esters (FAEEs) which can be used for a diesel alternative. In this study, we engineered the oleaginous microorganism which can accumulate large amounts of TAGs in their cell bodies for the production of FAEEs as diesel derivatives. The genes encoding TAG lipases were heterologously overexpressed in wild strain to hydrolize TAGs to free fatty acids. The engineered strain produced a large amount of free fatty acids from glucose in fed-batch fermentation. To produce FAEEs *in vivo* from these fatty acids, we constructed an ethanol biosynthetic pathway and overexpressed wax ester synthase in fadE mutant strain. Finally, biosynthetic pathways for the production of FAEEs were successfully developed in the engineered oleaginous microorganism. (NRF-2012-C1AAA001-2012M1A2A2026556 and NRF-2012M1A2A2026557)