

Engineering of Robust Bio-chemical Producing *Escherichia coli* with Non-Favored Sugars derived from Marine Biomass

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Marine biomass, known as the third generation of biomass for replacing fossil fuels, has many advantages rather than conventional biomass due to its high biomass productivity, carbon fixation rate and easy pretreatment process, etc. However, the challenging problem for using macroalgae as a feedstock is that sugars derived from marine biomass are not usually favored and utilized by many microorganisms such as *Escherichia coli*. Slow utilization rate of non-favored sugar limits reduced carbon flux and results in low productivity and titer and production using non-utilizable sugar is virtually impossible. In this research, we tried to develop robust *E.coli* to utilize various sugars from marine biomass and to produce some commodity chemicals. For utilization of these sugars, rationally designed pathway with synthetic promoter, 5'UTR, terminator for maximum catalytic activity were introduced. And downstream pathway was fine-tuned at a key node. With this approach, we successfully demonstrated that the engineered strain was able to utilize sugars from red seaweed and efficiently produce bio-chemicals.