Use of *Escherichia coli* for the production of phenol through metabolic engineering

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Phenol's biological production from renewable resources has been limited due to its toxicity and complex biosynthetic network of aromatic compounds. To address these issues, simultaneous engineering of 18 Escherichia coli strains were introduced with synthetic regulatory sRNA technology for the production of phenol. Among the 18 strains, BL21 strain produced phenol most efficiently: 419 mg/L by flask culture and 1.69 g/L by fed-batch culture. In water-tributyrin biphasic fermentation, the concentration of phenol in the tributyrin phase and fermentation broth reached 9.84 and 0.3 g/L, respectively, in 21 h, which translates into the final phenol titer and productivity of 3.79 g/L and 0.18 g/L/h, respectively. Although further engineering is required, the strategies used for the development of the engineered strain and fermentation process will provide a valuable framework for the microbial production of toxic chemicals. [This work was supported by the Intelligent Synthetic Biology Center (2011-0031963) through the Global Frontier Research Program of MEST.]