A synthetic approach for simultaneous utilization of galactose and cellobiose in *Escherichia coli*

임현규, 서상우, 정규열*
POSTECH
(gyjung@postech.ac.kr*)

Microbial production of chemicals and fuels from renewable biomass requires utilization of multiple carbohydrates. Red seaweed, especially *Gelidium amansii*, has been touted for its high biomass productivity, high carbon fixation rate, easily degradable structures compared to terrestrial biomass. A combined weak acid and enzyme pre-treatment of red seaweed, galactose and cellobiose can be obtained easily. However, galactose metabolism is quite slower than glucose and only few microorganisms can metabolize cellobiose. In this study, *E.coli* was engineered to metabolize galactose and cellobiose simultaneously by removal of nascent regulation and replacement of expression cassettes to synthetic units. Each gene encoding pathway enzymes was expressed under the control of synthetic parts including promoters, 5'-untranslated regions (5'-UTR), and terminators as re-organized single operon in chromosome. The engineered strain showed capacity to simultaneously assimilate galactose and cellobiose. This work demonstrated the possibility of synthetic biology tools to rebuild the biological systems on engineering purpose.