

**Enzymatic synthesis of 2-butanone from 4-oxopentanoic acid by acetoacetate decarboxylase from *Clostridium acetobutylicum***

민경선, 이회석<sup>1</sup>, 엄영순\*, 상병인<sup>2</sup>, 유영제<sup>3</sup>

Clean Energy Research Center, KIST; <sup>1</sup>Graduate Program in Bioengineering, Seoul National University; <sup>2</sup>Department of Chemical Engineering, Hanyang University; <sup>3</sup>School of Chemical and Biological Engineering, Seoul National University (yum@kist.re.kr\*)

2-Butanone is a widely used low-boiling solvent in various industries and currently is produced by the dehydrogenation of secondary butanol or the direct oxidation of n-butene. Herein, we presents a renewable synthesis of 2-butanone from 4-oxopentanoic acid (4OPA), which is produced from cellulosic biomass and considered as an important building block for value-added chemicals, via enzymatic decarboxylation. Acetoacetate decarboxylase (AADC) from *Clostridium acetobutylicum* was employed as the biocatalyst and expressed in *E.coli* with a 6xHis tag. Permeabilized whole cells of *E. coli* expressing AADC converted 8.8% of 4OPA into 2-butanone. The purified enzyme converted 26.1% of 4OPA into 2-butanone. The kinetic parameters and stability of the enzyme were investigated. We also propose the catalytic mechanism of 4OPA to 2-butanone via enzymatic decarboxylation.