Production of gamma-aminobutyric acid from glucose by introduction of synthetic scaffolds in recombinant Escherichia coli

홍순호†, Murali kannan Maruthamuthu, Van Dung Pham
울산대학교
(shhong@mail.ulsan.ac.kr†)

Escherichia coli were engineered for the direct production of gamma-aminobutyric acid from glucose by introduction of synthetic protein scaffold. In this study, three enzymes consisting GABA pathway (isocitrate dehydrogenase, glutamate synthase and glutamate decarboxylase) were connected via synthetic protein scaffold. By introduction of scaffold, 0.92 g/L of GABA was produced from 10 g/L of glucose while no GABA was produced in wild type E. coli. The optimum pH and temperature for GABA production were 4.5 and 30oC, respectively. When competing metabolic network was inactivated by knockout mutation, maximum GABA concentration of 1.3 g/L was obtained from 10 g/L glucose. The recombinant E.coli strain which produces GABA directly from glucose was successfully constructed by introduction of protein scaffold. This work was supported by a grant from the Next-Generation BioGreen 21 Program (SSAC, grant number: PJ011116) by RDA, and Basic Science Research Program by the Ministry of Education (NRF-2014R1A1A2054726).