Gamma-Aminobutyric Acid Production by Combining Neurospora crassa OR74A Glutamate Decarboxylase and Escherichia coli GABA Transporter

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Gamma-aminobutyric acid is a precursor of nylon-4, which is a promising heat-resistant biopolymer. GABA can be produced from the decarboxylation of glutamate by glutamate decarboxylase. In this study, a synthetic scaffold complex strategy was employed involving the Neurospora crassa glutamate decarboxylase (GadB) and Escherichia coli GABA antiporter (GadC) to improve GABA production. To construct the complex, the SH3 domain was attached to the N. crassa GadB, and the SH3 ligand was attached to the N-terminus, middle, and C-terminus of E. coli GadC. In the C-terminus model, 5.8 g/l of GABA concentration was obtained from 10 g/l glutamate. When a competing pathway engineered strain was used, the final GABA concentration was further increased to 5.94 g/l, which corresponds to 97.5% of GABA yield. With the introduction of the scaffold complex, the GABA productivity increased by 2.9 folds during the initial culture period.