

Efficient malic acid production in *Escherichia coli* through a synthetic scaffold protein complex

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Recently, malic acid has gained attention due to its potential application in food, pharmaceutical, and medical industries. In this study, the synthetic scaffold complex strategy was employed between the two key enzymes pyruvate kinase (PykF) and malic enzyme (SfcA); SHB ligand was attached to PykF and the SHB domain was attached to the C-terminus of ScfA. Synthetic scaffold systems can organize enzymes spatially and temporally to increase the local concentration of intermediates. In a flask culture, the recombinant strain harboring scaffold complex produced a maximum concentration of 5.72 g/L malic acid from 10 g/L glucose. The malic acid production was significantly increased 2.1-fold from the initial culture period. Finally, malic acid production was elevated to 30.2 g in a 5 L bioreactor from recombinant strain XL-1 blue.