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**Genetic and metabolic engineering for microbial production of poly- $\gamma$ -glutamic acid**Mingfeng Cao<sup>a,1</sup>, Jun Feng<sup>b,1</sup>, Sarote Sirisansaneeyakul<sup>c,\*</sup> sarote.s@ku.ac.th, Cunjiang Song<sup>d</sup>,Yusuf Chisti<sup>e,\*\*</sup> Y.Chisti@massey.ac.nz

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**Abstract**

Poly- $\gamma$ -glutamic acid ( $\gamma$ -PGA) is a natural biopolymer of glutamic acid. The repeating units of  $\gamma$ -PGA may be derived exclusively from D-glutamic acid, or L-glutamic acid, or both. The monomer units are linked by amide bonds between the  $\alpha$ -amino group and the  $\gamma$ -carboxylic acid group.  $\gamma$ -PGA is biodegradable, edible and water-soluble. It has numerous existing and emerging applications in processing of foods, medicines and cosmetics. This review focuses on microbial production of  $\gamma$ -PGA *via* genetically and metabolically engineered recombinant bacteria. Strategies for improving production of  $\gamma$ -PGA include modification of its

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