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High-level soluble expression of the *hemA* gene from *Rhodobacter capsulatus* and comparative study of its enzymatic properties

Key words: 5-aminolevulinic acid; *Rhodobacter capsulatus*; high-level expression; enzymatic properties

- 5-aminolevulinic acid (ALA), a precursor of tetrapyrroles and a key intermediate in regulating tetrapyrrole biosynthesis, is now a commerical product and has been applied worldwide.

- We introduced the *Rhodobacter capsulatus hem*A gene into *E.coli* Rosetta (DE3) for the high-level expression of ALA synthase (R.C.-ALAS), as shown in Fig.1, and studied its enzymatic properties compared with ALASs encoded by the *hem*A genes from *Agrobacterium radiobacter* (A.R.-ALAS) and *Rhodobacter sphaeroides* (R.S.-ALAS).

- The enzymatic properties of the three ALASs are shown in Fig. 5-9.

- The activity of purified R.C.-ALAS reached 198.2 U/mg, which was about 31.2% and 69.5% higher than A.R.-ALAS (151.1 U/mg) and R.S.-ALAS (116.9 U/mg), respectively.

- The fed-batch fermentation was conducted using recombinant strain *E. coli* Rosetta (DE3)/pET28a-R.C.*hem*A, and the yield of ALA achieved was 8.8 g/L (67 mmol/L), which increased the ALA production over 20% and 33% than the yield achieved by recombinant *E. coli* containing the *hem*A genes from *A. radiobacter* zju-0121 (Fu et al., 2010) and *R. sphaeroides* (Fu et al., 2008), indicating a good potential for its industrial applications.