

## Expression of codon-optimized carbonic anhydrase from *Hahella chejuensis* for CO<sub>2</sub> capture system

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Carbonic anhydrase (CA; EC 4.2.1.1) has been considered as a biocatalyst adequate for the development of CO<sub>2</sub> sequestration process. The high production of functional CA is required for practical CO<sub>2</sub> sequestration application mediated by CA. Here, the synthetic gene new  $\alpha$  type-CA (HC-aCA) of *Hahella chejuensis*, which was designed based on *Escherichia coli* codon usage, was employed for *E. coli* expression system. We obtained a high yield of functional HC-aCA by denaturing/refolding process and incorporating zinc ion into its active site. The refolded HC-aCA showed a half-deactivation temperature of 60°C with maximal activity at 50°C, and had high pH stability in alkali condition with maximal activity at pH 10.0. The esterase activity of HC-aCA almost doubled at high salt concentration ranging from 0.67 to 2.0 M NaCl. HC-aCA catalyzed the conversion of CO<sub>2</sub> to CaCO<sub>3</sub> as a calcite form in the presence of Ca<sup>2+</sup>. The refolded HC-aCA could be a potent candidate for development of efficient CO<sub>2</sub> sequestration processes.