Carbonic anhydrase: Biocatalytic agent for CO_2 capture system development

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Carbonic anhydrase (CA, EC 4.2.1.1) is one of the enzymes, which can be employed for CO2 sequestration technology development. CA catalyzes a reversible hydration of carbon dioxide: CO2 + H2O ↔ H+ + HCO3- (1.1) (Box 1) including varieties of other reactions. Interestingly, CA has the ability to catalyze the hydration of over 600,000 molecules of carbon dioxide per molecule of CA per second comparable to a theoretical maximum rate of 1,400,000. CA can fix large quantities of CO2 into CaCO3 in presence of suitable cations at modest pH values in vitro. CA has such distinctive CO2-catalyzing properties and is now being attended as prominent biocatalysts for CO2 sequestration technology development. Here, new genes of functional alpha type-CAs (aCA) from marine resources were acquired and synthesized as codon-optimized forms for E. coli expression. We set up over-expression system of aCA in E. coli. host and prepare separation/purification (renaturation, if necessary) procedures to produce high-functional CA forms.