

**Carbonic anhydrase(CA) -Phosphoenolpyruvate Carboxylase(PEPCase) Co -Immobilized Enzyme
Microbead for CO₂ Bioconversion and Organic Acid Production**

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In this study, Carbonic anhydrase(CA) and Phosphoenolpyruvate Carboxylase(PEPCase) were immobilized and stabilized in magnetically -separable enzyme microbeads(EMBs) using electrospinning method. These two enzymes are crucial for CO₂ mitigation and counteraction of greenhouse effect, because they simultaneously capture CO₂ and utilize four -carbon compounds. This microbead composed of branched polymer(polyethylene glycol), magnetic bead, and silica shell for mechanical, long-term stability and recyclable property. By developing this integrated system, we successfully converted CO₂ to oxaloacetate, which is organic acid and base compound for precursor of bio-polyester. This CA -PEPCase co-immobilized EMB retained high activity and stability. Furthermore, the magnet-based separation was also successful for the reuse of the EMBs.