

Business Interaction Vouchers Round 5 (April 2021)

Immobilising enzymes on mesoporous carbonaceous materials for potential application in carbon capture	
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Company	Starbons Ltd
<p>Enzymes have many potential uses as a low energy, sustainable way of making reactions happen in a controlled way. To be more broadly useful, they have to be in a form that can be used and reused in flow and heterogeneous systems. One such way is immobilisation.</p> <p>Starbon[®] materials are bio-derived, biodegradable materials that work like a solid sponge where we can change the size and stickiness of the holes. They have already been proven in lots of applications including catalysis and gas capture. Starbon[®] materials have been shown to be mainly macroporous (the right size to hold enzymes) and mesoporous (the right size for chemicals to come in and out), making them perfect for this project.</p> <p>Currently, absorption with monoethanolamine (MEA) as a solvent is the most mature and effective technique for CO₂ capture but it is costly, corrosive and has a high energy penalty. Hydration of CO₂ into HCO₃⁻ in an aqueous medium can be accelerated by carbonic anhydrase (CA), but the free enzyme is easily deactivated under the conditions of strong alkali, acid solvent or high temperature. The stability of CA has been greatly enhanced by adsorption to mesoporous silica and mesoporous aluminosilicates.</p> <p>Various Starbon[®] materials will be produced and trialled with enzyme immobilisation, for the hydration of CO₂ to carbonic acid. This project has the potential to provide a sustainable feedstock to supersede petrochemical-derived products. This ties specifically to BBSRC strategies to utilise new approaches to applying enzymatic systems for the production of high value chemicals.</p>	