BioCement

Technology Brief

BioCement (or MICP – Microbial initiated Carbonate Precipitation) is a new technology that uses bacteria to initiate crystallisation of carbonates to form a high strength cemented product. The process essentially replicates the formation of sandstone on a much shorter timescale. While it is particularly suited to in-situ application as it can stabilise soil and other particulate matter without disrupting its original structure, it can also be used as a manufacturing process for moulded cemented products. Multiple applications include earth stabilisation for tunnelling, mining and earthquake repair, repair of deteriorating masonry and built structures, "instant pavement", filters and ornamental and structural blocks. This technology has also been recognised as world leading; with research on this topic being numbered amongst Time Magazine's Best Inventions of the Year – 2007.

Advantages

- The reagents for Biocement are produced at relatively low temperatures compared to Portland cement where production involves heating ingredients to temperatures of up to 1500° C.
- BioCement has the potential to be used as an eco-construction material as it has the potential to require less energy to produce the cement and hence involves the release of less greenhouse gases than production of other brick/cement construction material.
- Biocementation has been shown to achieve mechanical strengths that are comparable to conventional cement. Multiple treatments can control the strength developed.
- The porosity and look (texture, colour) of the original particulate matter is largely maintained, ie the use of sand in the BioCement process would result in a sand coloured and textured block, similar looking to sandstone. Effects can be produced using multiple sand colours.
- The cementation process can be conducted in-situ without disrupting the structure of the original soil.
- BioCement has the potential to be used in both unsaturated and saturated (including marine) applications.

The Opportunity

Murdoch University is seeking interested parties for taking the BioCement technology to commercialisation in moulded cement products, ie bricks or blocks, including eco-construction materials, instant pavements, treatments to preserve and restore built structures and various niche high value products. The potential exists to also partner with our civil engineering commercialisation and research partners, through Murdoch, to leverage their current R&D experience in up-scaling of the technology for in-situ applications.

In addition opportunities exist to undertake collaborative research focusing on the use of BioCement with alternate particulate materials, process upscaling for bacterial production and energy and carbon emission assessments of the process.

IP Status

The BioCement process is the subject of a patent application PCT/AU2005/001927 (WO06066326) with priority date 20 December 2004, made by Murdoch University and Calcite Technology Pty Ltd. National Phase has been filed in multiple countries.

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MD4522-7-08