Towards Using Microbes for Sustainable Construction Materials: a Feasibility Study

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THE PROBLEM

- Reinforced concrete is susceptible to damage.

- Current repair strategies include cementitious patching and/or chemical treatment.
  - Expensive: estimated to cost $18-21 billion per year
  - Causes pollution issues
A POTENTIAL SOLUTION: BIOCONCRETE

BIOINSPIRED SUSTAINABLE CONCRETE

Using & understanding microorganisms & their metabolic processes to repair cracks in concrete is a promising new approach to solve a grand challenge for engineering.

RESEARCH OBJECTIVES

Demonstrate the feasibility of using microbes to provide self-healing properties to RC structures — preventing water and chloride ingress.
APPROACH - TASKS

- **Task A:** Literature Review (Milestone 1)

- **Task B:** Isolate Microbes from Reinforced Concrete. (Milestones 2 – 4)

- **Task C:** Development & Evaluation of Concrete Mixes. (Milestones 5 – 7)

- **Task D:** Bench-Scale Self-Healing & Leaching Tests. (Milestones 8 and 9)
Starting May 13th

2 students over the summer will work on Milestones 1 - 2
APPLICATION OF RESEARCH PRODUCT

- Results from this feasibility study will provide a first step towards the development of a new reinforced concrete design which:
  - Has a longer service life
  - Is more economical
  - Is more environmentally friendly / sustainable

- If feasible, BioConcrete can be scalable for applications to a wide range of infrastructure and buildings

- Results will be used to expand BioConcrete concept to address other durability issues in RC (e.g. corrosion)