

Towards Using Microbes for Sustainable Construction Materials: a Feasibility Study

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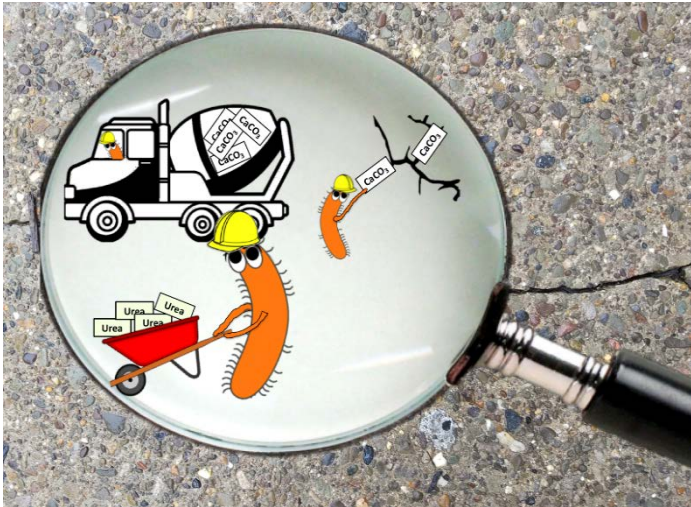
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THE PROBLEM

- 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)

SCHEDULE

Research Task	Month												
	1	2	3	4	5	6	7	8	9	10	11	12	
A	Milestone 1												
B		Milestone 2		Milestone 3&4									
C					Milestone 5								
D							Milestone 6&7						
Proposal Submission (Future Funding)									Milestone 8&9				
Manuscript Preparation and Submission										Milestone 8&9			
Conference Participation											Milestone 8&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)