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Self-healing concrete with bacteria encapsulated in expanded clay

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Preparation process and the life service solicitations can cause damage on concrete's internal structure, creating cracks that tend to propagate and increase with time. This poses a potential risk of failure as water penetrates, corroding the rebar what considerably reduces concrete's life span. It is know that cement can exhibit up to a certain extent a natural ability to self-heal, a consequence of the long-term hydration phenomenon. Hence, some initial cracks can be spontaneously closed if the right conditions are met (humidity). This, however, will not be enough to repair most of the major cracks that are formed internally over a long period of use, so strategies need to be developed to achieve an efficient level of self-healing. Search for a more sustainable and durable concrete, less prone to cracking, lead to a new concept – self-healing. This concept, inspired by the natural ability of plants and human skin to spontaneously heal, inspired researchers to search for a method of conferring concrete with the ability to repair internal damage. The biological approach presents itself as a suitable alternative to achieve healing in concrete. In this work, bacteria were immobilized in expanded clay before being added to concrete. In order to incorporate the expanded clay, some of the aggregate was replaced within the concrete. This works presents the results obtained for the final mechanical strength and self-healing efficiency of concrete containing encapsulated bacteria.

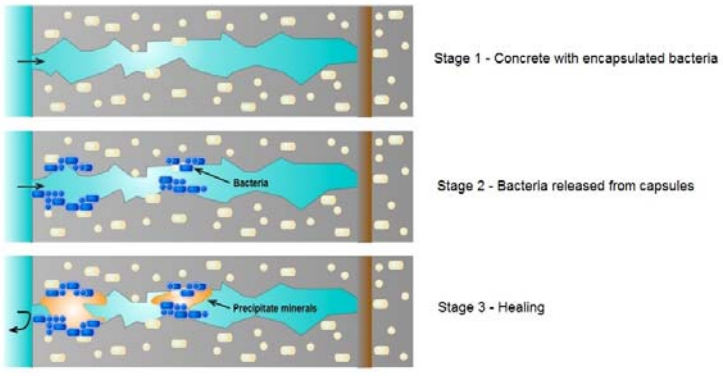

Figure 1 – self-healing mechanism in bacteria concrete

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Oral presentation