Utilization of *Sporosarcina pasteurii* for microbially induced calcite precipitation in recycling waste concrete fines

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In the context of global warming and climate change, the Paris Climate Agreement was adopted in 2015 by 194 countries. The signatories commited, among other environment-related activities, to reduce emissions of greenhouse gases, including carbon dioxide (CO_2). The construction sector contributes to the global anthropogenic CO_2 emissions by about 7% (Fahimizadeh et al., 2020). The lion's share is attributed to the production of cement clinker, essential for the production concrete (Dapurkas & Telang, 2017). Strategies to reduce energy consumption and CO_2 emissions associated with cement productionhave been proposed to ensure environmental protection and sustainable development.

In order to tackle the issue ofdisposal of waste concrete fines (WCF), the utilization of hydrated cementitious paste and stripped mortar generated during concrete recycling has been sought. In this study, we employ the natural process of biomineralization –microbially induced calcite precipitation (MICP) and investigate its efficiency. Two types of old WCF generated during processing of disposed concrete elements were tested for this purpose. The materials varied in their grain size distribution, and fineness. The MICP process took advantage of the ureolytic activity of the alkaliphilic bacterium *Sporosarcina pasteurii* DSM 33, able to precipitate calcium carbonate crystals after the supply of urea and calcium ions. The experiment was carried out at four different time intervals (14, 30, 60, and 90 days) during which MICP solution was added to WCF and mixed with *Sporosarcina pasteurii*. After the defined time period the conglomerates were dried out and their physicochemical properties (cohesiveness, porosity, strength, formation and type of carbonate crystals, and compositional analysis) were assessed.

Our results clearly indicate that MICP using ureolytic bacteria could be an effective strategy to recycle WCF, rendering concrete recycling more efficient and eco-friendly.

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