A review on the use of microbial induced calcite precipitation for problematic soil engineering

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The use of conventional techniques for soil stabilization often involves chemical compounds which are not environmentally friendly and can be hazardous. Moreover, newly introduced regulations which target zero CO_2 emission demand new construction policies and alternative construction solutions. When it comes to soil improvement, reducing the level of greenhouse gas emission would mean searching for eco-friendly stabilizing agents rather than resorting to traditional ones such as lime and cement. Biological soil stabilization techniques which include the use of a variety of microorganisms such as bacillus, cyanobacteria, microalgae [e.g.,1-6], and/or the use of enzymes present in the microbial metabolic paths [e.g., 7], as well as biopolymers [e.g., 8-9] are among alternative solutions for soil improvement. In this contribution, a review on different biological soil stabilization techniques will be presented. The aim is to characterize different biological techniques and their strength and challenges. Then the focus is placed on the class of methods which is based on the microbial calcite precipitation (MICP) and its use for problematic soil engineering. The application of MICP for problematic soil engineering will be reviewed and the recent findings on the efficiency and efficacy of MICP to treat dispersive, expansive and collapsible soils [10-14] are briefly explained and suggestions for future studies, on this topic, are put forward.

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