

微生物诱导固化技术研究进展

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摘 要:微生物诱导固化(Microbial induced carbonate precipitation, MICP)技术因其环境友好性已成为近年来研究的热点。本文对 MICP 的固化机理进行了介绍, 阐述了细菌、成核位点和生物膜对 MICP 矿化反应的影响, 并对相关理论模型进行了总结, 包括该技术涉及到的溶液的传输与分布、尿素水解速率和孔隙模型等。通过对相关文献进行总结发现, 基于 MICP 具有良好的流动性并且可以生成具有胶结性沉淀的特点, MICP 能够在砂土固化、地基改良、防渗封堵、混凝土修复等领域发挥出良好的改善效果, 具有广阔的应用前景。最后, 在已有研究成果的基础上, 对 MICP 当前研究的问题以及未来的研究方向进行了讨论与展望。

关键词:微生物固化技术; 理论模型; 砂土固化; 地基改良; 防渗封堵; 混凝土修复

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Research Advances in Microbially Induced Carbonate Precipitation

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Abstract: Microbially induced carbonate precipitation (MICP) has become a research hot spot due to its environmental friendliness in recent years. This paper introduces the mechanism of MICP, and expounds the influence of bacteria, nucleation microdots and Extracellular Polymeric Substances (EPS) on the reaction of MICP. Similarly, the relevant theoretical models involved in this technology are summarized, including the model of solution transmission and distribution, the model of urea hydrolysis rate and the model of pore. In addition, through summarizing the relevant literature, it is found that, based on MICP better fluidity and cemented precipitation, MICP can play a good improvement effect in broadly application fields, such as sand solidification, foundation improvement, anti-seepage plugging, concrete repair. Finally, the current research problems and future research directions of MICP are discussed and prospected based on the current research results.

Key words: microbially induced carbonate precipitation; theoretical model; sand solidification; foundation improvement; anti-seepage plugging; concrete repairing

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