
# Effective microbial calcite precipitation by a new mutant and precipitating regulation of extracellular urease

Hui Li, Youxin Song, Qijiu Li, Jianwei He, Youtao Song

PII: S0960-8524(14)00855-4
DOI: http://dx.doi.org/10.1016/j.biortech.2014.06.011
Reference: BITE 13545

To appear in: *Bioresource Technology*

Received Date: 9 March 2014
Revised Date: 2 June 2014
Accepted Date: 4 June 2014

Please cite this article as: Li, H., Song, Y., Li, Q., He, J., Song, Y., Effective microbial calcite precipitation by a new mutant and precipitating regulation of extracellular urease, *Bioresource Technology* (2014), doi: http://dx.doi.org/10.1016/j.biortech.2014.06.011

# Effective microbial calcite precipitation by a new mutant and precipitating regulation of extracellular urease

Hui Li[a], Youxin Song[c], Qijiu Li[a], Jianwei He[a], Youtao Song[a,b,*]

[a] Province Key Laboratory of Animal Resource and Epidemic Disease Prevention, School of Life Science, Liaoning University, Shenyang, 110036, China

[b] School of Environmental Science, Liaoning University, Shenyang, 110036, China

[c] Affiliated Hospital, Chengde Medical University, Chengde, 067000, China

## Abstract

Microbial calcite precipitation is a promising and environmental friendly biological technology in remediation of the surface and subsurface of porous media, especially for in-situ soil remediation. The present study isolate a urea-degrading strain LH1 from soil on soybean root, identified as *Bacillus niabensis* strain (99% similarity) by 16S rRNA gene sequencing analysis. Then, using ultraviolet mutagenesis method, a mutant LHUM107 with outstanding urease-producing ability was further obtained to study its effects on calcite precipitation. The mutant LHUM107 had good genome stability and exhibited 92.2% urea-degrading efficiency till 21$^{st}$ generation. Response surface methodology (RSM) noted that the urea degradation was more dependent on initial urea addition, and brought forward the optimal conditions. Adapting to these optimal conditions, calcite precipitation by mutant LHUM107 and extracellular urease was respectively further investigated. It was shown that extracellular urease excreted from mutant LHUM107 was more effective and more targeted for $CaCO_3$ precipitation.

**Key words:** microbial calcite precipitation; urea-degrading; extracellular urease; *Bacillus*; 16S rRNA gene sequencing

*Correspondence author: Province Key Laboratory of Animal Resource and Epidemic Disease Prevention, School of Life Science, Liaoning University, Shenyang, 110036, China. Tel: +86-024-62202682; E-mail address: ysong@lnu.edu.cn.