

Isolation and Characterization of a Biominerals-producing Bacterial Strain with the Aim of Environmental Engineering

Ali Vahabi¹; Kambiz Akbari Noghabi*¹; Ali Akbar Ramezaniapour²

1- National Institute of Genetic Engineering and Biotechnology, Tehran, Iran

2-Amirkabir University, Tehran, Iran

vahabi_a85@yahoo.com

Background & Objectives: Recently, biotechnology-based Methods have significant application in different aspect of sciences. Numerous researches have been done to produce biominerals using specific microorganisms with the aim of sand consolidation, limestone monument repair and filling of pores and cracks in concrete. Concrete has a wide range of applications and is the most consumed materials in construction industry. Therefore, it is necessary to improve concrete properties.

Methods: Current research was done to isolate the appropriate indigenous strain induced precipitation for applying in concrete. So, samples were obtained from different places including limestone cave and soil. Samples were cultured in an appropriate medium to isolate species which had the ability of mineral precipitations. Then after, precipitates were examined by Fourier-Transform Infrared (FT-IR) spectrometry. The isolated bacterial strain with the best performance was selected for application in mortar specimens. The effects of selected indigenous microorganisms on concrete properties were determined as well.

Results: A bacterial strain (isolated from soil) was selected with significant potential for producing of high amount of calcium carbonate precipitate. The bacterial strain was identified as *Bacillus pasteurii* by morphological, biochemical and molecular approaches. The biomineral precipitates were examined by Fourier-Transform Infrared spectrometry (FT-IR) as calcium carbonate-based minerals.

Conclusion: It can be concluded that current Methods with production of stable biomineral precipitates in pores and cracks of mortar, could have a positive effect on its plugging and improve cement properties. So, applying bacteria in concrete could be considered as a promising novel approach that will be resulted in revolutionising concrete manufacturing industry.

Keywords: Environmental; Engineering; Biotechnology