The 2018 World Congress on
Advances in Civil, Environmental, & Materials Research (ACEM18)
Songdo Convensia, Incheon, Korea, August 27 - 31, 2018

Keynote Paper

Cementless Soil Stabilizer – Biopolymer

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ABSTRACT

Recently, environmental hazards such as global warming and desertification are threatening humankind and human civilization. Earth (*i.e.*, soil) has been the basis of human life and prosperity across the ages and in all countries of the world. However, concurrent global climate change and accompanying land degradation are creating socio-economic problems such as farmland loss, international air pollution (fine dust), severe famine in Africa, water shortages, and so on. The field of geotechnical engineering has a responsibility to preserve the land of Earth. Furthermore, geotechnical engineering must prepare alternative extra-planetary territory for human survival in an extreme future scenario. First, the recent convergence between geotechnical engineering and biotechnology is introduced to suggest an environmentally-friendly approach for soil treatment and preservation. Microbial biopolymers, adopted as new soil binders, can function to enhance soil inter-particle interactions and plant growth with low environmental impacts (*e.g.*, CO2 emission, groundwater disturbance). A series of experimental research have investigated the bio-chemical interactions between biopolymers and soil which induces significant strengthening, and the optimal conditions for biopolymer treatment have been explored considering different types of biopolymers and soils. Today, bio-soil technologies are being practically implemented, including cement-free Earth pavement, Slope and embankment stabilization, Aeolian erosion reduction, and in-situ ground improvement practices. Ideas and future strategies for commercialization practices are also discussed in this study.

Keywords: Biopolymer; Soil stabilization; Bio-soil; Sustainability; Microbial polysaccharide;

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