

Manufacturing geopolymer construction material from lunar soil simulant incorporating biologically precipitated calcium carbonate

*Jinwoo An¹⁾, Arthur Cabo²⁾, Jae-Hoon Hwang³⁾, Yong Je Kim⁴⁾,
Boo Hyun Nam⁵⁾ and Bubryur Kim⁶⁾

^{1), 2)} *Department of Civil Engineering, University of Texas Rio Grande Valley, TX, USA*

³⁾ *Dept. of Building, Civil & Environment Eng., Concordia University, Montreal, Canada*

⁴⁾ *Department of Civil Engineering, Lamar University, TX, USA*

⁵⁾ *Department of Civil Engineering, Kyung Hee University, Gyeonggi-do, South Korea*

⁶⁾ *Dept. of Robot and Smart System Engineering, Kyungpook University, Daegu, Korea*

¹⁾ jinwoo.an@utrgv.edu

ABSTRACT

The long-term vision of the Artemis mission involves not only constructing a lunar base but a lunar colony. However, due to limited resources on the moon and carrying capacity, the creation and shipment of conventional building materials for a lunar colony is unrealistic and unsustainable. This research project advocates for the development of manufacturing capabilities utilizing existing tools within the Artemis mission. Algae cultivation, integral to future Artemis missions, serves as a key component, and this project envisions repurposing algae byproducts (biologically precipitated calcium carbonate) into construction materials for lunar structures. As a result, this research team aims to create and test geopolymer concrete samples using biologically precipitated calcium carbonate from coralline algae and sodium hydroxide and silicate with lunar regolith stimulants. The results show that geopolymer concrete samples made from lunar soil simulant and biologically precipitated calcium carbonate is capable of supporting medium-load construction projects.

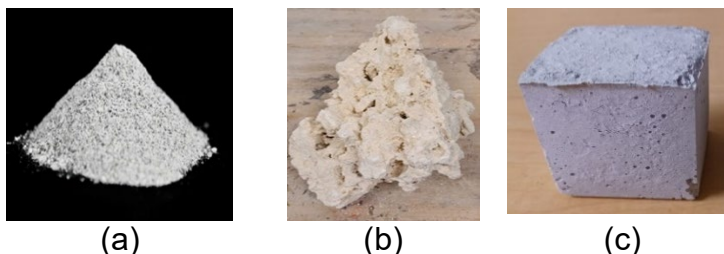


Fig. 1 (a) Lunar stimulant soil, (b) coralline algae and (c) geopolymer concrete sample

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^{1), 3), 4), 5), 6)} Professor, ²⁾ Graduate Student