## Geopolymer Stabilization of Earth Building Material for Construction 3D Printing

Authors : Timur Mukhametkaliyev

**Abstract :** The earthen material possesses low compression strength, and it is highly sensitive to the water content. Different binders can be added (Portland cement or lime) to improve the durability and the mechanical characteristics of earthen material, but the production of these binders has high embodied energy and results in an increase in world CO<sub>2</sub> emission. Geopolymers are binders which can be synthesized at low temperature in alkaline solutions from raw materials consisting of amorphous aluminosilicates. Geopolymers are an attractive substitution of Portland cement and can be used as an excellent stabilization for earthen material. In this study, earthen material stabilized with geopolymer binder for use in construction 3D printing offers freedom of design, waste minimisation, customisation, reduced labour, and automation. For successful 3D printing, the properties of used material are the most important aspects because they require adaptability for extrusion and controlled time of hardening for the binder.

Keywords : 3D printing, building construction, geopolymer, architecture

Conference Title : ICSMC 2021 : International Conference on Smart Materials for Construction

Conference Location : Prague, Czechia

Conference Dates : March 22-23, 2021

1