

Designing different geopolymer mixtures for construction on the Moon

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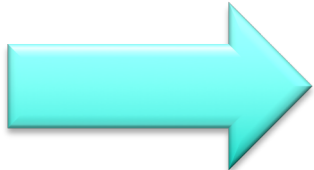
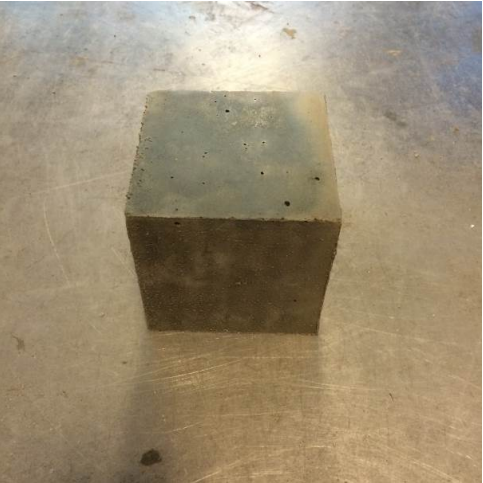
The Main fields of Advanced Materials research group:

- ✓ Construction materials
- ✓ Geopolymers
- ✓ Phase Change Materials
- ✓ Hydrogels
- ✓ Nano- and micro-particles
- ✓ Polymers



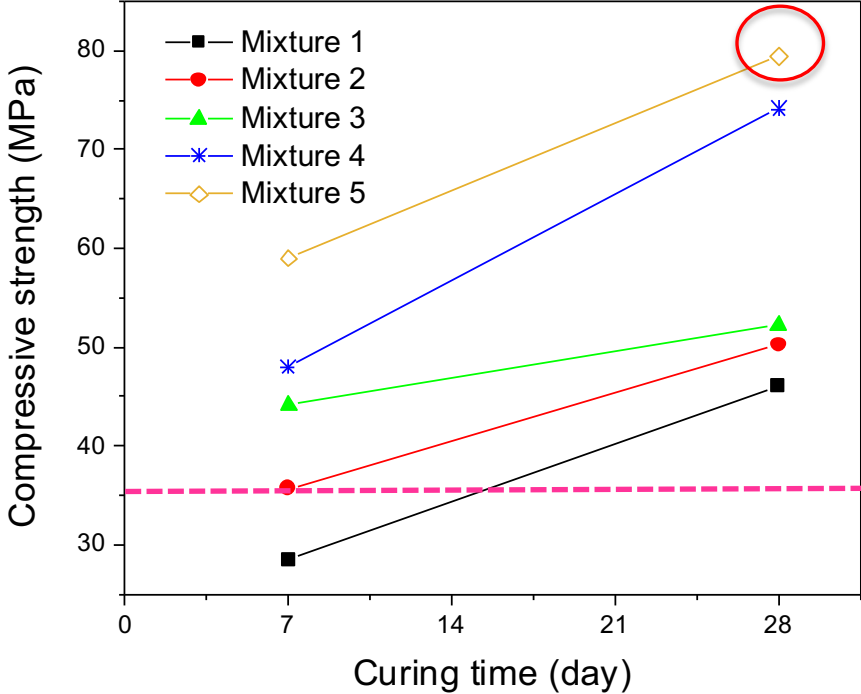
Designing different GPC mixtures

Geopolymer concrete made in our concret lab with high compressive strength



A failed slump test of a geopolymer concrete

Compressive strength of different mixtures designed in our concrete lab



----- Compressive strength of Portland cement concrete after 28 days

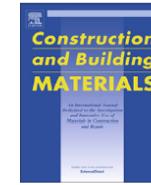


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Physical and mechanical properties of fly ash and slag geopolymer concrete containing different types of micro-encapsulated phase change materials



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European Space Agency



Initial conditions for designing a lunar geopolymer mixture

- Severe temperature fluctuation
- Vacuum
- Limited available water
- High radiation
- High transportation costs
- Meteoroid



Designing different lunar geopolymers



Receiving simulated lunar regolith from ESA

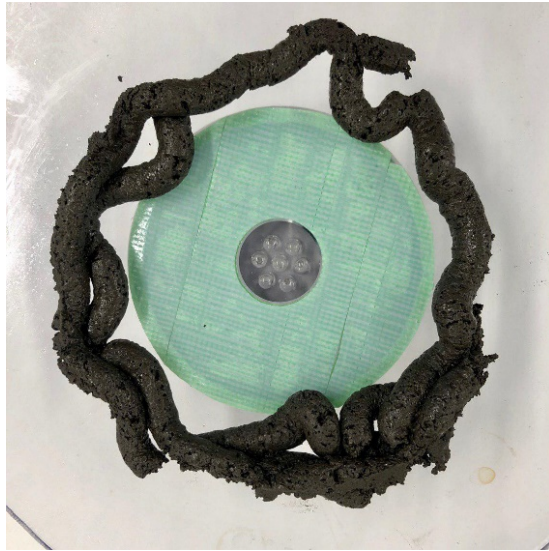


Working on the different mixture designs



Different lunar geopolymers
Water to solid ratio: 0.19

Testing different properties



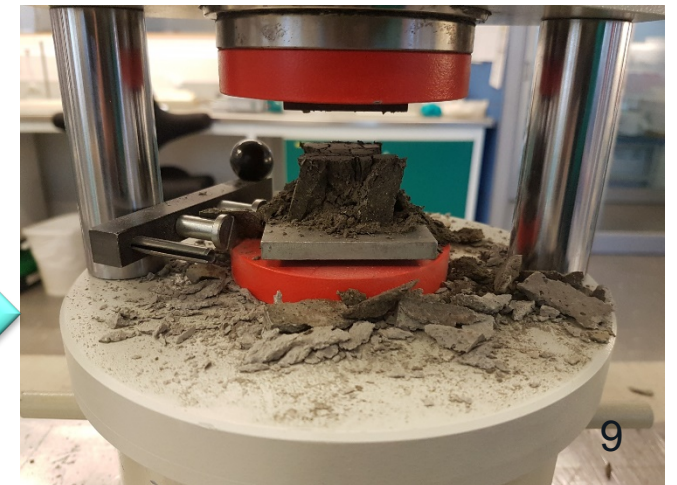
← Extrudability in the vacuum

A simulated lunar freeze-thaw cycle in the vacuum →



← Layer-by-layer buildability

Compressive strength after a lunar freeze-thaw cycle →



Future steps

- ❖ Adding basalt fiber to the geopolymer mixture
- ❖ Radiation protection property (Looking for any partnership for this test)
- ❖ 3D printing



One of our research stations which is established in a mountainous area with the harsh weather conditions for testing energy supplies and building materials under challenging conditions

Thank you for your attention



It is me in the
near future

