RegoCrete-BGX: Engineering a Fiber-Reinforced Multi-Aggregate Concrete for Future Space Constructions

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This study presented RegoCrete-BGX, a fiber reinforced, multi-aggregate concrete developed using lunar regolith, basaltic rock, and waste glass designed for future space applications. The concrete blocks were formulated with varying aggregate combinations and tested for compressive strength at 7 and 14 days of curing, both with and without glass reinforcement. Results demonstrated that normal concrete blocks achieved significant strength growth over 14 days, while lunar regolith and basaltic rock-based blocks achieved high compressive strengths suitable for structural applications. The addition of glass fibers notably enhanced the performance of lunar regolith and waste glass concrete, increasing durability and structural integrity. Glass fibers, although traditionally used for tensile reinforcement, contributed to improved block consistency and reduced porosity, further supporting their effectiveness in multi-aggregate mixes. The study highlighted the adaptability of lunar regolith when combined with selected terrestrial materials, achieving concrete strengths comparable to traditional blocks and proving its feasibility as a construction material for extraterrestrial environments. These findings emphasize the potential of utilizing in-situ lunar resources to create sustainable building materials, reducing dependency on Earth-supplied components and enabling cost-efficient construction on the Moon. RegoCrete-BGX represents a promising advancement in engineer resilient, resource-efficient concrete for space infrastructure. Future research will explore optimizing fiber content, water ratios, and aggregate proportions to further enhance mechanical performance, durability, and applicability for large-scale extraterrestrial construction properties.

Awards Won: