Moon-opoly: Utilizing in situ Resources (ISRU) for the Construction of Lunar Concrete

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The colonization of space will be important to the future of mankind. Our nearest celestial body is the moon, and creating a suitable building material using lunar resources will be critical to maintaining a colony there. My proposed solution is to create a type of Lunar-Crete; a mix of lunar regolith (moon-dust) and elemental sulfur (available from lunar rocks). When these two materials are blended and heated above 140 degrees C - they will bind together and form a concrete-like material, suitable for habitable structures or other construction purposes. To test my Lunar-Crete concept, I purchased a lunar regolith “simulant” and elemental sulfur, and mixed them in two ratios. Additionally, I added 5% fiberglass to one of the mixtures. I added these mixtures to a mold and heated them, creating multiple samples. Finally, I tested each Lunar-Crete sample for compressive strength, and compared those results to conventional concrete - which I made separately using an identical mold. Both Lunar-Crete mixtures successfully fused, and made a solid casted cylinder of homogenous material. These cylinders were then compression tested in an industrial materials lab. Lunar-Crete was found to be approximately half as strong as conventional concrete. However the Lunar-Crete version that included fiberglass was found to be 10% stronger than traditional concrete. In conclusion, by extracting sulfur from lunar rocks, recombining the sulfur with lunar regolith, and heating the mixture above 140 degrees C , a useful building material was successfully created. When corrected for the effects of reduced lunar gravity, Lunar-Crete could be considered comparably as strong as conventional concrete.

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