Title – Method for Waterless Lunar Concrete Using Enstatite or other Magnesium-Silicate.

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Abstract

The problem with using indigenous materials from the moon are that they can be difficult to process in microgravity. A few materials such as FeS and Enstatite ($MgSiO_3$) have reasonable liquidus melting temperatures and required pressures that can be easily reached. The liquidus temperature of Estatite for low pressure and temperature (1 GPa, 1400 C). $MgSiO_3$ has some advantages for use as lunar habitat formwork. It is a good attenuator of radiation. Two, it can be manfuactured without the use of water through heating to molten state. Three, sintering the material releases some oxygen. In contrast, other lunar materials have either a high molecular weight, low attentuation coefficients, low abundance, confounding elemental components, or high melting point. This material has higher abundance, relatively low molecular weight, reletively low melting temperature and routinely extractable using common Mg extracting techniques. The requirements of the material are set at melting temperature less than 1800 C, High abundance, contain oxygen for harvest, and molecular weight less than 100 grams. The objective of the experiment shall be to identify mixing parameters (viscousity, miscibility) with other low melting temperature minerals such as FeS.

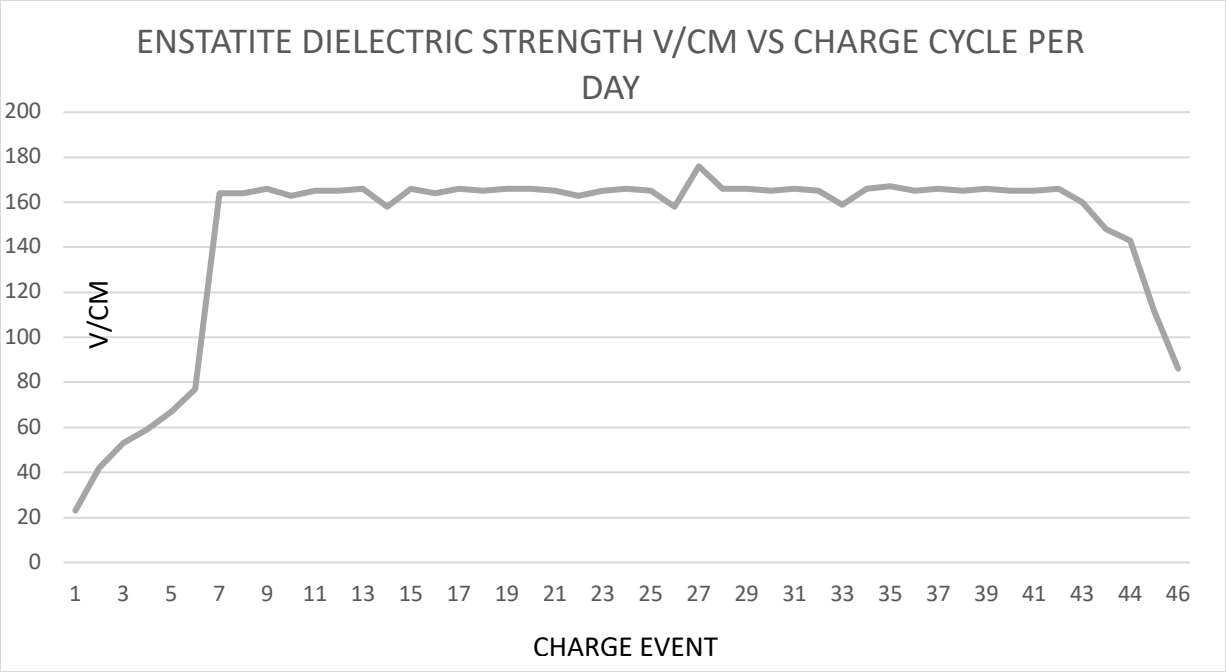

Figure 1 Illustration of Dielectric Strength of Enstatite vs Number of Charge Cycles. Material breakdown at 43 days.