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AEROGEL BASED THERMAL INSULATION AND UV RESISTANT SYSTEM FOR MOON AND  
MARS SETTLEMENT**Abstract**

Aerogel composed of 99% Air, is very lightweight and an excellent thermal insulator. In this paper I will be presenting the design for a habitable outpost for moon and mars which offers excellent resistance against UV rays, great thermal insulation which helps in maintaining the temperature inside the outpost despite the extreme temperature variations on mars(20C to -153C) and moon(127C to -173C), all by just one material. The paper is divided into two individual parts for moon and mars respectively. Protection against the harmful UV rays is very necessary for humans to sustain a longer life because these rays have a direct impact on our DNA chain and exposure to these rays longer than the safety limit causes cancer and ultimately leads to premature death. To protect the aerogel layer of the habitat from the meteoroids, protection is also provided in the form of Martian soil for mars and lunar soil for moon. The fiber composite layer is placed inside the habitat and the mechanical support structure is made by concrete (made from ice, calcium oxide and Martian aggregate) for the habitat on mars whereas, lunar concrete (made from ice, calcium oxide and lunar aggregate) for the habitat on moon. The composite can be either assembled here on earth by an inflatable system on a habitat's sub-structure or the composite and habitat's components can be sent to mars by a series of missions and can be assembled there. It can also be 3d printed depending upon the requirements of the mission. For the flow of light into the habitat with a resistance from radiation, silica aerogel can also be used as a filter for glass windows as it is translucent. This paper also focuses on the calculations which involve heat transfer between external and internal environments of the habitat respectively as well as strength calculation of the habitat. The insulation and UV resistance offered by the protective layer of the soil is also considered.