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SPIRITED SKIES PROJECT: SILICA AEROGEL DOMES FOR THE HABITAT OF THE FUTURE

Abstract

The hypothesis of this paper is the examination of dome constructions using the space technology nanomaterial silica aerogel as insulating material. Silica aerogels are nanomaterials with excellent thermal insulations properties because 99.98% of their volume can be pure air. Insulation's origin is the Latin insula 'island', an "isolated land" we could say. Planet Earth is a "space island", in other words an oasis enveloped by its atmosphere: a layer of gases named sky surrounds our planet and protects life from genetic damage by ultraviolet solar radiation. By imitating nature -and in order to protect themselves- humans create garments and architectures. The primary function for garments and architecture is to insulate and to protect the human body. Silica aerogels could be considered as the eco friendly "plastic" of the 21st century because they can find application in any field. As aerogels are phenomenal energy savers they could be the paradigmatic materials for designing the insulation for future sustainable space habitats. Aerogels represent one of the most promising materials for thermally insulating buildings of the future, since the material demonstrates high performance, exhibiting thermal conductivities of 10 – 20 mW/(mK) in insulated, commercial products not used in a vacuum. Aerogels, when manufactured, can exhibit varying degrees of opacity, including both translucency and transparency, thereby enabling a diverse variety of applications for insulation in buildings that might require access to daylight or exploit sunlight for energy. Silica aerogel is the material-epicentre of all of the author's multidisciplinary research. During the interactive presentation we will propose the design of small glass domes entitled Spirited Skies and Heaven in a Glass where silica aerogel was poured into jacketed glass beakers and micro clouds were settled in between the glazing. We are also proposing for a future space mission to test if these water (or wine) glasses with various blue and gold skyscapes in between double walled glass, could relieve the astronauts of their nostalgia for our home planet.