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PHOTOBIOREACTOR FAÇADE SYSTEM FOR SELF-SUSTAINABLE MOON SURFACE HABITAT

Abstract

The purpose of this article is to find a prototype of a hybrid functional façade that integrate life-support, food and energy regenerating system for the Moon surface habitat at South pole. So that we are going to explore the ‘photobioreactor façade system’ which is kind a new terrestrial architecture system today, in order to transfer to Moon surface habitat. The photobioreactor has algae on the photovoltaic glass module and the sustainable circulation system façade allows to create O₂, H₂ and clean water. And after the conversion processes, the algae can regenerate Biogas, Bio Fertilizer, food, and electricity. This bioreactor utilizes a light source to cultivate phototrophic microorganisms. These organisms use photosynthesis to generate biomass from light and carbon dioxide and include plants, mosses, macroalgae, microalgae, cyanobacteria and purple bacteria. <Raman Kumar, Anil Kumar Sharma, Sarabjeet Singh Ahluwalia, 2017>

Obviously, the design of façade system will be studied with protection function against thermal differences, extreme temperature, space radiation, vacuum, etc. Also, this new façade system will allow to make a ‘self-sustainable’ habitat that would influence human health, food, psychology, and energy efficiency by the algae.

In fact, Marc Cohen who is a space architect, already suggested the ‘Water wall system’* with green algae in a purification bag which integrate Life Support System for long duration. However, he proposed to use it inside of a spaceship. Like he proposed, this technology with water can be a solution for the other planetary habitat where has a harsh space radiation. Therefore, this system will be studied together with Marc Cohen’s papers to find possible architectural exterior design for Moon habitat.

*_{ii}WATER WALLS ARCHITECTURE: MASSIVELY REDUNDANT AND HIGHLY RELIABLE LIFE SUPPORT FOR LONG..._{ii} Global Space Exploration Conference. Washington D.C. United States. Copyright ©2012 by Marc M. Cohen.