LUNAR CEMENT CONSTRUCTION WITH SURFACE AND UNDERGROUND ROOMS BASED ON CARBON CIRCULATION SYSTEM. T.Tanosaki1 and Yasunori Miura2, 1 Central Research Inst., Taiheiyo Cement Co. Ltd., 2Graduate School of Sci. & Eng., Yamaguchi University, Yoshia 1677-1, Yamaguchi, Yamaguchi 753-8512 Japan. yasmiura@yamaguchi-u.ac.jp

Introduction: Lunar building construction on the surface with various design are reported so far [1]. On the other hand, various designs of underground building on the Moon are proposed so far [1]. However, these models are not based on material circulation system including carbon (C).

The purpose the paper is to show joint house with surface and underground with lunar cement materials based on carbon cycle system.

Problem and model of lunar surface building: Serious problem for surface building on the airless Moon should be considered to continuous destruction by extra-lunar materials. Previous building models on planet Earth are based on beautiful and economical building on the terrestrial surface without any meteoritic bombardments, which is based on thick atmosphere against serious hazards [1]. Present model for surface building is hard cement building with carbon cycle to show marking location of underground lunar base as shown in Table 1

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Table 1. Problem and model for surface building on the Moon.

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1) **Problem:** Continuous destruction by extra-lunar materials.
2) **Characteristics of surface builing:** Marking spot for the lunar base.
3) **Present model for surface building:** Cyclic building mainly for location of the lunar base

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Problem and model of lunar underground building: Main problem for underground building on the airless Moon is strong hazard building against moonquake, lunar volcanism and bombardments by extra-lunar materials. Previous underground building models are mainly based on material circulation with food supply and chemical reaction of waste material [1]. Present model for underground building is hard and cyclic cement building with carbon cycle to maintain underground lunar base as shown in Table 2.

Material circulation on the Moon in the present model is shown as state changes of carbon (C) by vapor-liquid-solid (VLS) reactions as follows:

Building materiasl with C etc. ⇔C state-changes (VLS) ….(1)

Table 2. Problem and model for underground buildings on the Moon.

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1) **Problem:** Continuous destruction by extra-lunar materials.
2) **Characteristics of underground building:** Main living and working spaces for the lunar base.
3) **Present model for underground building:** Cyclic building for any hazard of the lunar base with material waste cycles

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Material circulation including destruction of hazard activity: All materials on Earth (and previous Moon) are how to avoid from strong hazards or destructions which are formed by harder and anti-destruction building with cement and so on. From natural system of materials, destruction by any movements

are normal process to material cycle with collection and destruction. The present model is different point of material cycle with any destruction process. It is so expensive to build against any destruction, but it is economical way to material cycles including waste cycle on the Moon and Earth finally [2, 3, 4]. This is mainly because scale of hazard should be endless and no upper limit against any hazard.

Main sources of light elements from lunar rocks: Light elements of hydrogen (H), carbon (C) and nitrogen (N) are inevitable for carbon cycle on the Moon, where all elements are found on the Apollo lunar samples of regolith and polymict breccias [1, 2, 3, 4].

Summary: The lunar base with joint system of surface and underground buildings with carbon-bearing cement should be included as material cyclic system against any hazard and destruction on the Moon as shown by equation (1), which is the most economical way to maintain the lunar base finally.

References:

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