*The 2023 World Congress on*
***Advances in Structural Engineering and Mechanics (ASEM23)***
*GECE, Seoul, Korea, August 16-18, 2023*

# Research on self-healing of fiber-reinforced lightweight concrete after exposure to 500 °C by biomineralization technology

* Chao-Wei Tang[1)], How-Ji Chen[2)], Ting-Yi Yang[2)], Shu-Ken Lin[2)], Chien-Yen Chen[3)], and Yi-Hao Kuo[4)]

[1)] *Department of Civil Engineering & Geomatics, Cheng Shiu University, No. 840, Chengching Rd., Niaosong District, Kaohsiung City, Taiwan R.O.C.*
[1)] *tangcw@gcloud.csu.edu.tw*
[2)] *Department of Civil Engineering, National Chung Hsing University, 145 Xingda Rd., South Dist., Taichung City 40227, Taiwan (R.O.C.)*
[3)] *Department of Earth and Environmental Sciences, National Chung Cheng University, No.168, Sec. 1, University Rd., Minhsiung, Chiayi 621301, Taiwan (R.O.C.)*
[4)] *Chunmin Construction Company No.148, Linzitou, Dalin Town, Chiayi County, Taiwan (R.O.C.)*

## ABSTRACT

This study aimed to explore the self-healing of fiber-reinforced lightweight concrete by biomineralization after exposure to 500 °C. Concrete specimens of a control group and an experimental group were prepared, the former was concrete using lightweight aggregates without bacterial spores and nutrient sources, and the latter was concrete using lightweight aggregates containing bacterial spores and nutrient sources. After exposure to 500 °C, the two groups of concrete specimens healed themselves in different ways. The self-healing method of the control group was to directly immerse the specimen in the water tank of a curing room for healing. The self-healing method of the experimental group was to immerse the specimen in a mixed solution of urea and calcium acetate for one day, and then take it out and place it in the air for one day. A cycle was two days until the desired age was reached. The results show that the strength recovery of concrete after exposure to 500 °C was closely related to the self-healing environment. The control group was self-healing in water. Due to the regeneration of the C-S-H phase and the carbonate phase, the micropores were filled, which healed the cracks and restore the strength of the part of the concrete specimen. In contrast, the specimens in the experimental group could ensure the effective operation of biomineralization under the condition of providing nutrient sources, and the mechanical and water penetration test results after self-healing were better than those of the control specimens.

---

[1)] Professor