

The effect of temperature to bacterial self healing processes for building materials

Pavla Ryparová, Pavel Tesárek, Zdeněk Prošek, and Hana Schreiberová

Czech Technical University at Prague, Thákurova 7, 16629 Praha 6, Czech Republic

The concrete is the most widely used construction material worldwide for its high compressive strength and good durability. The degradation of this material begins instantly after application in construction. The first degradation signs are change of chemical composition and cracking. The cracks are gates for water-soluble substances inlet. Many methods are developed for repairing concrete construction. They are divided in two groups: man-induced and self-healing.

The self-healing methods are spontaneous or bacterial induced. The bacterial induced calcitation for repairing of cracks is the topic of this article. The chosen bacteria are from group which is adapted for growth in high pH which is encountered in concrete, and they can create calcite. We used three bacteria *Sporosarcina pasteurii*, *Bacillus cohnii*, *Bacillus pseudofirmus* and we carried out a study of the influence of temperature. Our previous experiment proved that bacteria in spores (*Bacillus pseudofirmus*) were able to survive the temperatures in the range from -20°C to 140°C . This experiment extends the study to determine the effect of temperature on the change in growth activity and amount of calcite formed. The bacterial activity was measured as the change of absorbance. The value of created calcite was measured by standard analytic methods.

The experiment was performed for optimal temperature (30°C) and lower temperature (10°C) and it used the suitable broth for calcitation. The results showed that beginning of metabolism activity was shifted by 40 to 50 hours. Only *Bacillus cohnii* showed different results because its metabolic activity was nearly zero at 10°C .

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