

SEM INVESTIGATION OF MICROBIAL CALCITE PRECIPITATION IN CEMENT

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ABSTRACT

Scanning electron microscopy (SEM) is shown effective in documenting the role of bacteria in microbiologically-induced mineral precipitation. In this work, microbial plugging of artificially-cracked cement mortar beams was studied using *Bacillus pasteurii* combined with different filling materials. After curing for 28 days, specimens were fractured and the interface between the filling material and cement mortar was examined using SEM. Well-formed crystals, measuring 200 μm or more in length were observed as precipitates binding particles of the filling material and binding filling material to the crack wall. Energy-dispersive X-ray spectra of the crystals show only Ca, indicating that the precipitated material is calcite (CaCO_3). Furthermore, many calcite crystal faces show hollow, rod-like impressions of *B. pasteurii*, where bacteria in contact with the calcite interfered with normal crystal growth. These microscopic observations serve to confirm the mechanism of microbial calcite precipitation in cement.

Keywords: SEM, cement, calcite, *Bacillus pasteurii*