

## Evaluation of different TiO<sub>2</sub> photocatalysis based strategies to avoid algal fouling on cement based materials

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Algal fouling which is an important phenomenon affecting the aesthetical properties of building envelopes has also been identified as one of the pioneering mechanisms associated with the microbial attack on cement based materials. Thus, preventive methods such as the use of biocides and water repellents are frequently used to avoid this problem. However, leaching, short time durability and streaking phenomena are reported drawbacks of these existing technologies. In order to tackle these limitations, efficient, innovative and environmentally friendly strategies, such as titanium dioxide photocatalysis, are needed to provide an antimicrobial effect. In this research, a commercially available TiO<sub>2</sub> photocatalytic white cement together with a traditional white Portland cement to which TiO<sub>2</sub> was added at two different TiO<sub>2</sub> concentrations (5% and 10% on weight basis) were evaluated at laboratory scale as strategies to avoid algal fouling on building materials. Similarly, two different TiO<sub>2</sub> coatings (VS and WR-VS) were evaluated on aerated concrete to avoid this microbial attack. The evaluation was conducted during 16 weeks (4 months) using *Chlorella vulgaris* as algae species and an accelerated algae growth test set-up adapted with UV-A irradiation. Results based on fouling intensity (colorimetric measurements), area covered with algae (digital image processing) and visual inspection indicate no fouling on the commercially available photocatalytic cement paste samples. Similarly, VS and WR-VS samples evidenced delays of 4 and 16 weeks, respectively, in the algal fouling process.