

Effects of Titanium Dioxide Coatings on Building Composites for Sustainable Construction Applications

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Abstract : Improving the durability of building materials saves maintenance costs, construction time, and energy. In this study, titanium dioxide coated conventional and non-conventional composites were produced, and the effects of titanium dioxide coatings were investigated. Conventional composites were produced using river sand and Portland cement, whereas non-conventional composites were produced by partially replacing river sand and Portland cement with quarry dust and rice husk ash. Water absorption and thickness swelling tests were conducted on the produced coated and non-coated block samples. A reduction in water absorption was observed in the coated composite samples when compared to the non-coated composite samples, and this is an indication of the improved durability of the samples coated with titanium dioxide. However, there was an increase in the thickness swelling of coatings on the coated block samples, but this increase has a slight influence on the compressive strength of the coated samples. The outcome of this study indicates that coating composite building blocks with titanium dioxide will improve their durability. Also, the site exposure experiments revealed the self-cleansing properties of TiO₂-coated composite block samples, while the Rhodamine B discolouration test confirmed the photocatalytic features of TiO₂-coated composite block samples.

Keywords : titanium dioxide, water absorption, durability, mechanical properties, building composite

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