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Effect of Bacterial Cellulose and its Carbon Nanofiber Derivatives Addition on the Compressive Strength of Cement Paste Composite.

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The mechanical properties of cementitious materials, widely applied in construction, could be improved by reinforcement with cellulosic natural fibres. In this study, another type of natural fibers, i.e. the bacterial cellulose (BC) obtained from coconut jelly (nata de coco) was added to cement paste to form the reinforced composites. The coconut jelly was thoroughly washed and blended prior to mixing with cement pastes. Up to 15 wt% of BC was added to the cement paste. The workability of the cement composites was controlled to be the same for every mix. The samples were then tested for compressive strength at the age of 7 and 28 days. The improving trend of the properties for BC-cement composites was not clearly seen. However, when the BC was pyrolyzed, carbon nanofibers (CNF) were obtained. The cement pastes with CNF addition showed an improvement for their compressive strength. The strength increased with CNF amount and aging time. The morphology of both BC-cement and CNF-cement composites at their fracture surfaces was observed under scanning electron microscopy (SEM). The correlation between the mechanical property and microstructure was discussed.

Keywords: Bacterial Cellulose; Carbon Nanofiber; Cement; Compressive Strength

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