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# Mechanical properties and reinforcing mechanisms of cementitious composites with different types of multiwalled carbon nanotubes

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## Abstract

In this study, reinforcement effect of 12 types of multiwalled carbon nanotubes (MWCNTs) on mechanical properties of cementitious composites was investigated. Research results showed that among pristine MWCNTs with different diameters and lengths, the short MWCNTs with large diameter present the best reinforcing effect on strength of composites. Functionalization of MWCNTs is beneficial for enhancing strength of composites. Moreover, hydroxyl-functionalized MWCNTs feature a better reinforcement effect compared to carboxyl-functionalized MWCNTs. The best relative/absolute enhancements of 79%/74MPa and 64.4%/5.6MPa in compressive and flexural strength of composites are achieved by incorporating 0.5% of nickel-coated MWCNTs. XRD analyses revealed that the incorporation of MWCNTs decreases the orientation of CH in matrix, which is consistent with SEM observations. TG analyses showed that MWCNTs inhibit hydration of composites due to their absorption effect. However, extensive MWCNT networks improve microstructure of matrix and hinder the crack development under loading through fiber bridging and pull-out.

**Key words:** A. Carbon nanotubes and nanofibers; B. Strength; B. Mechanical properties; D. Mechanical testing

## 1. Introduction

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