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Reduced Graphene Oxide/Carbon Nanotubes Reinforced Calcium Phosphate Cement

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Abstract

Improving the mechanical properties of calcium phosphate cement (CPC) will be helpful for expanding its application range in the treatment of bone defect. In this work, reduced graphene oxide (RGO), which has two-dimensional structure and excellent mechanical properties, and carbon nanotubes (CNTs) were used as toughening materials collectively, to enhance the mechanical properties of CPC. Setting time, morphology and mechanical properties of CPC were analyzed. The two dimensional structure of RGO could increase the interface area between RGO and substrate, which achieved an effective transfer of load between substrate and RGO. Moreover, by reasons of bridging cracks, preventing crack extension, pulling out from substrate and interface debonding, the flexural strength and compressive strength of CPC were increased by $67.1\% \pm 4.8\%$ and $76.4\% \pm 10.6\%$ respectively. Therefore, the CPC composite we studied has potential to be used as load-bearing substitution in bone defects.

Keywords: calcium phosphate cement; reduced graphene oxide; carbon nanotubes; mechanical properties.

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