

Surface Modification of Bamboo Fibers for Reinforcing Cement-based Composites

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1. Introduction

Natural fibers-cement composites



Fig. 1. Limitations of cement.

Advantages:

- Improved toughness, ductility, flexural capacity, and crack resistance.

Challenge of NF/cement composites: Poor interfacial adhesion between NFs and cement

Bamboo fibers (BFs):

High tensile strength (639-813 MPa), low density (1.38 g/cm³), biodegradability, low cost (Defoirdt et al. 2010).

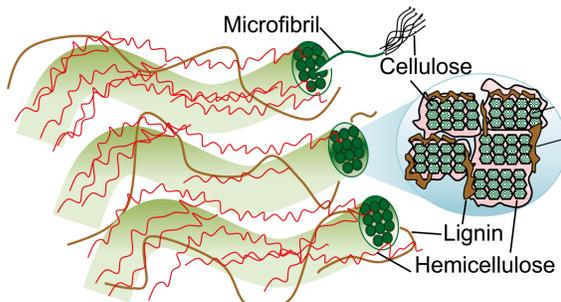


Fig. 2. Structure of BFs.

2. Surface modification of BFs

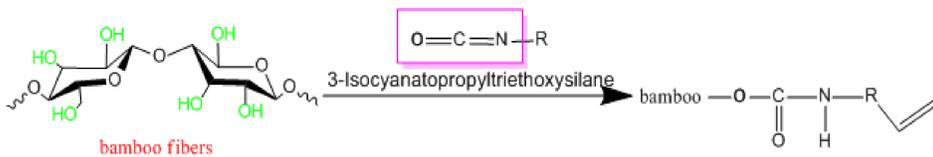


Fig. 3. Reactin between BFs and isocyanatepropyltriethoxysilane (IPTS)

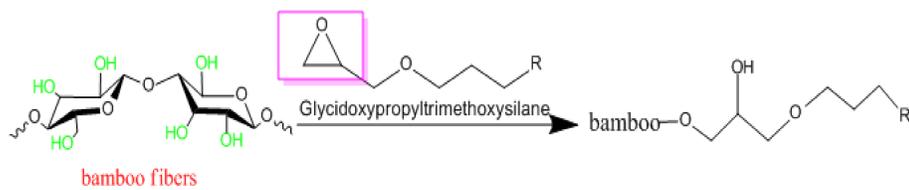


Fig. 4. Reactin between BFs and glycidyl ether oxypropyl trimethoxysilane (KH560)

3. Results and Discussion

Mechanical properties

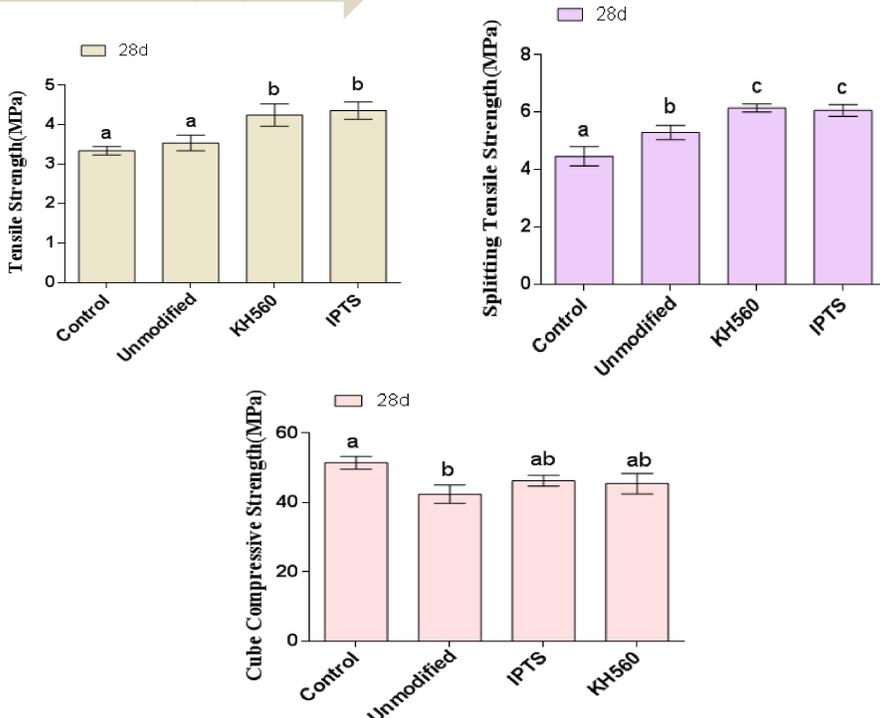


Fig. 5. Tensile strength, splitting tensile strength, and cube compressive strength of BFs/cement composites.

3. Results and Discussion

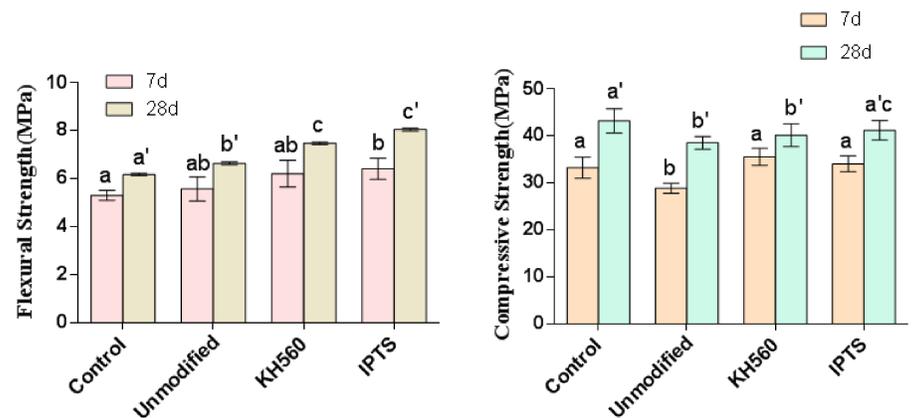


Fig. 6. Flexural strength and compressive strength of BFs/cement composites.

SEM images

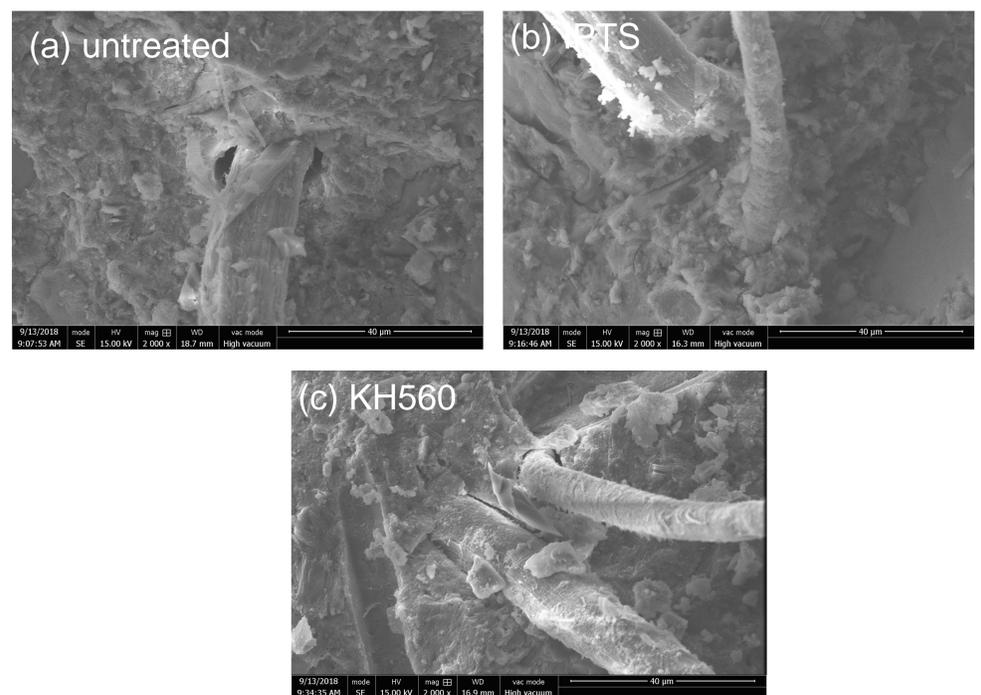


Fig. 7. SEM images of BFs/cement composites.

NMR analysis

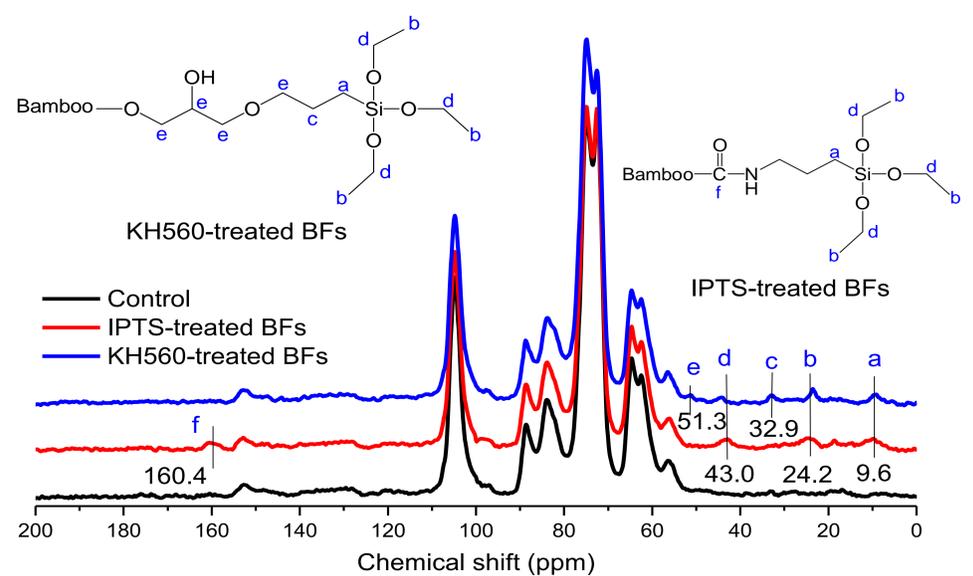


Fig. 8. NMR spectra of BFs

Conclusion

Surface modification of BFs would enhance the interfacial adhesion between BFs and cement, and thus improve mechanical properties of BFs/cement composites.

