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A temperature-induced conductive coating via layer-by-layer assembly of functionalized graphene oxide and carbon nanotubes for a flexible, adjustable response time flame sensor

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Abstract

A multilayered coating of Phenoxycyclophosphazene-functionalized graphene oxide (FGO) and chitosan-functionalized carbon nanotubes (CNTs) for wood pulp paper (WPP) is designed by a facile layer-by-layer assembly method. The obtained FGO/CNTs coated WPP shows enhanced mechanical properties as well as improved flame retardancy without deteriorating the intrinsic flexibility of WPP. Meanwhile, the electrical resistance of the hybrid FGO/CNTs structure is highly sensitive to flame and temperature, which makes the coated WPP an ideal fire sensor. The as-prepared flexible FGO/CNTs coated WPP sensor exhibits excellent shape retentivity and flame retardancy when burnt by ethanol flame or heat treated, and can detect fire by sensing the elevated temperature in several seconds before igniting the combustible materials. Besides, the response time is adjustable by varying the content of CNTs in

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