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Highly thermally conductive flame-retardant epoxy nanocomposites with reduced ignitability and excellent electrical conductivities

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Abstract: A highly efficient phenylphosphonate-based flame-retardant epoxy resin (FREP) was firstly prepared from phenylphosphonic dichloride (PPDCI) and allylamine (AA). Functionalized graphite nanoplatelets (*f*GNPs) fillers were then performed to fabricate the *f*GNPs/FREP nanocomposites *via* mixing followed by casting method. The thermally conductive coefficient (λ), thermal diffusivity (α), flame retardancy, electrical conductivities and thermal stabilities of the *f*GNPs/FREP nanocomposites were all enhanced with the increasing addition of *f*GNPs fillers. The λ and α value of the *f*GNPs/FREP nanocomposite with 30wt% *f*GNPs fillers was increased to 1.487 W/mK and 0.990 mm²/s, about 7 times and 6 times for that of pure FREP matrix (0.234 W/mK and 0.170 mm²/s), respectively. And the corresponding

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