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Novel phosphorus-containing halogen-free ionic liquid toward fire safety epoxy resin with well-balanced comprehensive performance

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ABSTRACT

Most flame retardants used in epoxy resin (EP) inevitably affect its curing process, mechanical properties as well as transparency. To solve this problem, a novel phosphorus-containing halogen-free ionic liquid ([Dmim]Tos), composed of imidazole cation modified with 9,10-dihydro-9-oxa-10-phosphaphenanthrene-10-oxide (DOPO) and tosylate anion, has been designed and used as a flame retardant for EP. DSC non-isothermal curing scans show that [Dmim]Tos has accelerating effect on the curing of EP. The addition of [Dmim]Tos enhances not only the crosslinking density but also the modulus of EP. The unnotched izod impact strength and the glass transition temperatures (T_g s) of EP/[Dmim]Tos are a little lower than pure EP because of the plasticization of unreacted [Dmim]Tos. Due to the good affinity with epoxy

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