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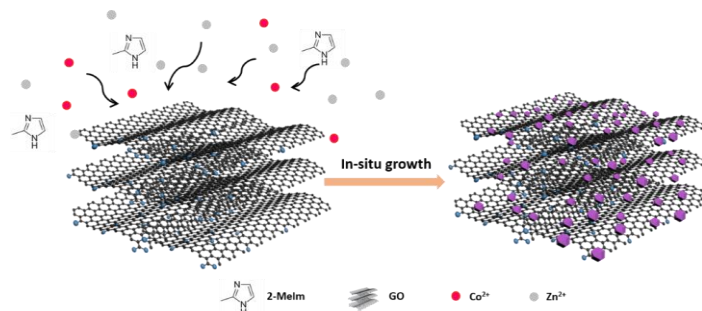
Multifunctionally Fire-Retardant Polymer Composites: From Molecular Design to High Performance

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Epoxy composites have drawn great attention in various applications due to its excellent properties such as high thermal stability, suitable mechanical strength, low cost and etc. However, high flammability as one of the main disadvantage of epoxy highly limited its practical applications. Producing eco-friendly, fire retardant and high performance epoxy composites is in high demand.

In this talk, through the controllable self-assembly synthesis, metal-organic framework and graphene oxide (MOF@GO) nano-hybrids was prepared as multifunctional synergist in the epoxy with intumescent fire retardant. Various fire tests including cone calorimeter test, LOI test and UL-94 test demonstrated that the novel MOF@GO nano-hybrids exhibited excellent fire retardancy, smoke suppression and mechanical property for intumescent epoxy due to the synergistic catalytic oxidation and carbonization from MOF. Formation of strong carbonaceous residue improved the structure of char and further protected materials, thus, leading to the excellent property.



Scheme 1 Scheme for preparing MOF@GO multifunctional fire retardants.

Table 1 Parameters of EP and its composites from cone calorimeter test and UL-94 tests.

Samples	UL-94 Test	pHRR (kW/m ²)	TSP (m ²)
EP	No	1005±23	36.9
EP/10IFR	No	809±15	25.9
EP/0.5MOF-9.5IFR	V-1	496±8	30.1
EP/0.5MOF@GO-9.5IFR	V-1	483±11	18.3