Curbing the flammability of epoxy resin

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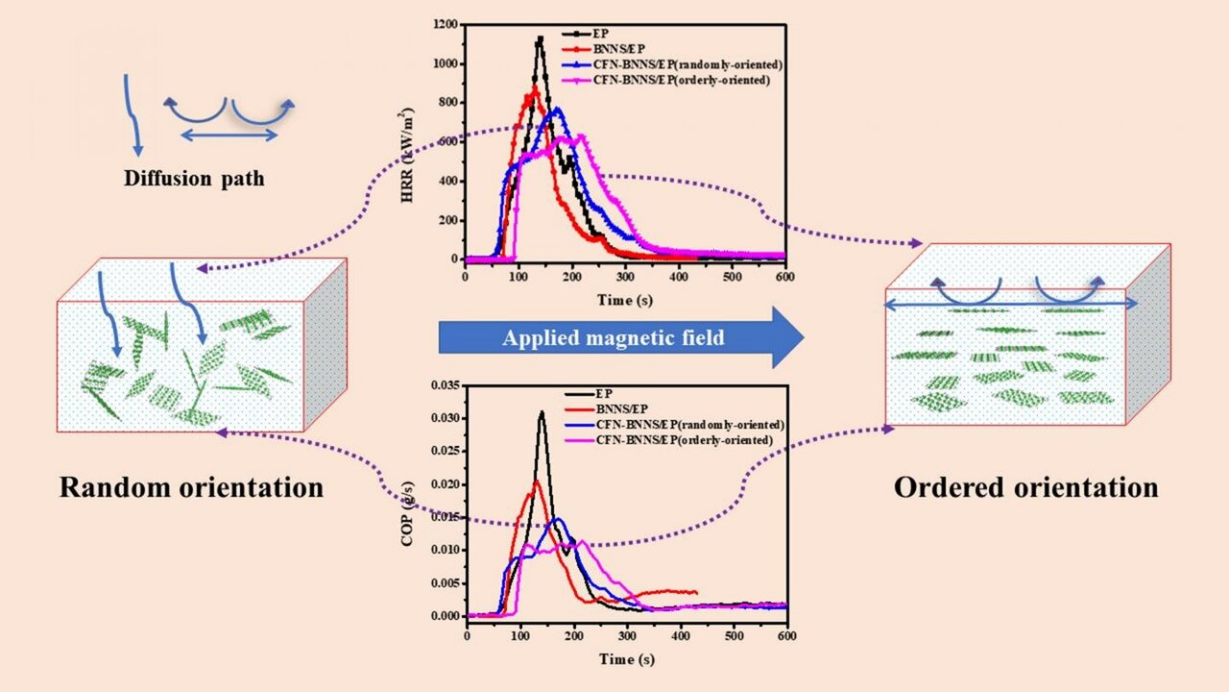

Cobalt ferrite nanoparticles decorated boron nitride nanosheets hybrid flame retardants were prepared through a simple solvothermal method. Subsequently, the orientation of the nanohybrids in epoxy resin was obtained under a rotating magnetic field. Due to enhancement of the barrier effect, the ordered alignment of the nanohybrids in epoxy resin contributes to better flame-retardant performance, compared with random one. Credit: Dr. Qiaoran Zhang, Prof. Xiaohong Li, *et al*.

In a paper to be published in a forthcoming issue of *Nano*, a team of researchers from Henan University have investigated the flame retardant

performance of epoxy resin using a boron nitride nanosheet decorated with cobalt ferrite nanoparticles.

Polymers are widely used in our daily lives due to good physical and chemical stability, corrosion resistance and other superior properties. However, most polymers, due to their organic nature, are inherently flammable which is a potential threat to the safety of human life and property. In order to avoid or reduce the flammability of polymers, it is a good strategy to add flame retardants to the polymers.

Among them, two-dimensional (2-D) layered inorganic nanomateirals (nanosheets), represented by graphene oxide, molybdenum disulfide, and boron nitride nanosheets (BNNS), exhibit excellent flame retardant performance due to their good physical barrier effects. However, the flame retardance is not enough in the use of such 2-D inorganic flame retardants alone, and in particular, the ability to suppress toxic gases and smoke is weak.

In this study, authors used cobalt ferrite nanoparticle (CFN) to decorate BNNS in order to obtain CFN-BNNS nanohybrids with good potential for reducing both the heat hazard and toxic hazard of epoxy resin (EP) composites, by making use of CFN synergistic effect. More importantly, the as-prepared CFN-BNNS has superior paramagnetic properties, thereby accommodating the ordered orientation of BNNS in EP matrix under a weak magnetic field that can act as a good physical barrier.

The ordered alignment of the CFN-BNNS in EP contributes to better flame retardant performance compared with random one. Namely, the flame retardant performance of the 2-D flame retardants can be improved by the ordered alignment under a weak magnetic field. This technology provides a new approach to improve flame retardant performance of 2-D flame retardants in thermoset polymer. This is the most significant novelty. And it will help researchers design and produce

more polymers with excellent flame retardant performance through this method.

More information: Qiaoran Zhang et al, Preparation of Cobalt Ferrite Nanoparticle-Decorated Boron Nitride Nanosheet Flame Retardant and Its Flame Retardancy in Epoxy Resin, *Nano* (2019). DOI: 10.1142/S1793292019500632

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