

Thermooxidative degradation of metal nanopowders/epoxy composites

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The introduction of metal powders into the polymer matrix results in changing the electrical conductivity, thermal conductivity, heat capacity, magnetic characteristics of polymeric materials in a wide range [1]. At the same time, the disadvantage of most polymers is their high flammability and low thermal stability [2]. In this regard, it is of interest to study thermooxidative degradation of polymeric composites at introduction of metal nanopowders as fillers.

The aim of this work is to study the thermooxidative degradation of epoxy composites filled with 5 % of copper and aluminum nanopowders, as well as with combination of metal nanopowders with boric acid. The thermal behavior of the metal nanopowders/epoxy composites at the heating to 900 °C under air was investigated by thermogravimetric analysis and differential scanning calorimetry.

This study showed that when a copper nanopowder is introduced as filler into epoxy matrix, rapid destruction of the sample is observed. Aluminum nanopowder has little effect on the thermal stability of epoxy composites in the process of thermooxidative degradation. At the same time, metal nanopowders lead to an improvement in the thermal stability of epoxy composites if they are combined with traditional flame retardants, for example, with boric acid.

References

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2. Morgan A.B., Gilman J.W. // *Fire Mater.* 2013. Vol. 37. P. 259–279.