

New developments in fire resistant materials

At a glance

William Blythe Ltd. is a leader in inorganic chemistry, supplying a specialist range of products for global use in advanced applications. The chemistry of four elements (copper, zinc, tin and iodine) defines the product range, which covers markets and applications from performance chemicals to polymer additives.

The company's Flamtard range of products forms the link between William Blythe Ltd. and Bolton University.

Flamtard H and Flamtard S are highly active flame retardants that counteract the formation of flame and smoke, whilst having no hazard classifications for human health or the environment. William Blythe's objectives are to understand the flame retardant effectiveness of the Flamtard range (in halogenated and halogen-free systems) and also to develop new inorganic flame retardants and smoke suppressants.

The work carried out by Fire and Materials at Bolton has identified certain flame retardants with which Wm Blythe's Flamtard S (zinc stannate, or ZS) and Flamtard H (zinc hydroxystannate or ZHS) can show synergistic activity in commercial polymer systems. Development of new flame retardant / smoke suppressant is ongoing.

Challenge

Flamtard H and Flamtard S have applications in flame retarded polymer compounds that are formulated with a halogen source, or in halogen-free systems. In halogenated systems Flamtard H and S work as synergists to increase the activity of halogenated flame retardants and, simultaneously, as smoke suppressants.

In halogen-free systems Flamtard is used for its ability to reduce smoke and stabilise the physical properties. Having a product that meets the polymer industry's aspiration to use products that are non-hazardous and environmentally benign, William Blythe Ltd. wished to understand the effectiveness of the Flamtard range in greater detail in order to promote them more effectively.

To progress the current work, William Blythe Ltd. is interested in developing new non-toxic, environmentally benign multifunction

synthetic inorganic compounds which impart fire retardance and smoke suppression to engineering polymers – without recourse to halogenated synergists.

Approach

With support from KCMC, William Blythe Ltd. sponsored a programme of work at the University of Bolton. A highly skilled post-doctoral researcher is working on this project. The first phase of the work involved an intensive literature and patent search around the use of tin compounds with different FRs / polymers. The results were used to design experimental work in order to assess the effectiveness of Flamtard H and/or Flamtard S alone or as a synergist in flame retardant systems within six selected polymers (polypropylene, polyamide 6, ABS, PVC epoxy and vinyl ester).

To develop new flame retardant / smoke suppressants, William Blythe Ltd. - with the help of KCMC and the NWDA - won an EPSRC funded Doctoral Research Project. A PhD student started on the project from October, 2010. This project will run upto March 2014.

Solution

At the Fire and Materials Laboratory, Bolton University, flame retarded polymer compounds (PVC, Polyester and Polyamide 6) based on commercial formulations were prepared in order to determine the flame retardant performance of Flamtard H and Flamtard S.

Using measurement techniques like Cone Calorimetry and industrially accepted standards (like Limiting Oxygen Index and Underwriters Laboratory Test: UL 94), the synergistic effectiveness of Flamtard products was established. As a result, a greater level of understanding has been achieved and the information can be used to advise on the most effective way to use Flamtard.

Benefits

The valuable information resulting from the co-operation of University of Bolton, KCMC and William Blythe Ltd. is being used in marketing literature for the expansion of Flamtard sales into new applications.