(PHOTO)OXIDATIVE DEGRADATION AND STABILIZATION OF FLAME RETARDED POLYMERS

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Flame retarded polymers are mainly used in long-term applications, therefore the role of stabilizers is decisive as many flame retardants influence the oxidative and photo-oxidative stability of polymers directly through acceleration of the degradation process or indirectly by interacting with antioxidants and light stabilizers. Whereas the behaviour of brominated flame retardants is well understood, the impact of halogen free flame retardants on the (photo)oxidation of polymers is only investigated in very few examples. However, phosphorus and nitrogen based flame retardants seem to influence the (photo)oxidative stability of polymers less than brominated compounds and they show no or less antagonism with hindered amine light stabilizers. Some recently developed flame retardants combine even flame retardancy and light stabilizer functionality.

Furthermore, many flame retardants act as a typical polymer filler, whereas it is known that filler interactions with stabilizers influence the overall stability of the polymer. This effect is even more critical if nano-sized materials are used. Adjustment of stabilization of plastics containing fillers either used for mechanical reasons or as flame retardant is necessary to achieve sufficient long-term properties. Filler deactivators and metal deactivators can play a decisive role in this respect.

Challenges of the (photo)oxidative stabilization of flame-retarded polymers are reviewed with regard to the components and mutual interactions with focus on halogen free flame retardants. Processing and long-term thermal stabilization of flame retarded polymers are discussed and strategies of improving the light stability of flame retarded polymers are provided. Additionally, the specific requirements of the stabilization of nanocomposites as potential flame retardant components are covered.