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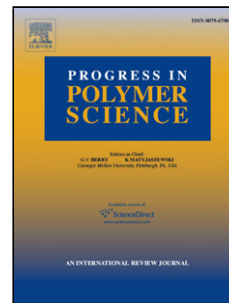
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Intumescence: tradition *versus* novelty.**A comprehensive review**

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Abstract

The objective of current research on intumescent formulations is on consolidated approaches for conferring flame retardancy properties to polymers and polymer blends. Numerous academic and industrial efforts have been carried out in the last fifteen years, by revisiting the traditional concept of intumescence on the basis of the new chemical synthesis or novel nano-technological developments. The main concepts of intumescence are reviewed in this report, highlighting the novelties as well as the most significant results achieved in the flame retardancy of polymeric materials in the last ten-fifteen years. Although the basic aspects of intumescence such as the chemical components, thermal and rheological aspects are well-known, the modeling and simulation of these systems are completely new and never reviewed. Analogously, the traditional chemical compositions will be compared with the novel systems, most of them based on the nanotechnology and synergistic aspects. Thus, the results collected up-to-now by using these new intumescent formulations will be dealt with the different polymer families. The use of current intumescent coatings for metals, steel, wood and plastics as well as the application of novel intumescent coatings deposited on fabrics, films and foams through Layer-by-Layer assembly are reviewed. Although the latter technique is not new, its use to confer flame retardancy properties to polymers is a recent development.

Keywords: intumescence, flame retardancy, combustion, calorimetry.

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