Effect on flame propagation in recycled expanded polystyrene with flame retardant/white clay/titanium dioxide nanocomposite

Reference	Presenter	Authors (Institution)	Abstract
04-013	Suellen Signer Bartolomei	Bartolomei, S.S.(FATEC - Sorocaba); Bartolomei, M.R.(Instituto de Pesquisas Energéticas e Nucleares); MOURA, E.M. (INSTITUTO DE PESQUISAS ENERGÉTICAS E NUCLEARES); WIEBECK, H. (ESCOLA POLITÉCNICA DA UNIVERSIDADE DE SÃO PAULO); Oliveira, R.R. (IPEN);	Polystyrene is widely used in construction due to its properties such as low density, heat resistance, durability and ease of processing and molding. However, it is highly flammable, releases a lot of heat and toxic smoke when exposed to a flame. However, in order for a material to be applied in habitable indoor environments, it must comply with fire safety standards, which predict the behavior of materials during their burning. Halogenated flame retardants have been used to reduce the spread of flame, but they are toxic and polluting, so more environmentally friendly products are being developed. Polymeric nanocomposites, formed by inorganic nanoparticles, have many advantages in flame retardation, such as low heat release rate, low smoke and toxic gas production. Alternatively, the organofilized, exfoliated or polymer-intercalated montmorillonite clay (MMT) can be used to form a nanocomposite with greater flame resistance. However, for the clay to achieve the results required by the standards, it is necessary to add a large amount of particles, which generates agglomerates in the material and losses in the mechanical properties. Therefore, the use of clays to improve flame resistance to the material must be accompanied by the use of other flame retardants. Thus clay will provide reduction in flammability and secondary flame retardant will provide ignition resistance. The addition of other particles, together with clay, can corroborate with the reduction in flame spread of the material, with titanium dioxide being used to increase thermal stability, UV light stability, mechanical properties as well as reduction in flame spread. In this work expanded polystyrene (EPS) from construction waste, with flame retardant in its composition, was recycled and plasticized with glycerol. In this polymeric matrix was added white clay and titanium dioxide in order to maintain the flameproof properties and improve the mechanical and thermal properties of the material. The results showed that it is possible to recycle EPS and maintain flame self-extinguishing through the material even in the presence of glycerol as plasticizer. The addition of white clay improved the mechanical properties of the material and increased thermal stability, but impaired the fire behavior of the material, ceasing to self-

extinguish the flame immediately after extinguishing the external flame. Titanium dioxide (TiO_2) kept the mechanical and thermal properties unchanged and reduced flame propagation in the specimen when compared to the results of clay nanocomposite.

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