Innovative and environmentally friendly intumescent flame retardant coatings for decorative wood surfaces in building construction

Wood as a natural and sustainable construction material for buildings is becoming increasingly important, partly because constructions made of wood can be erected in an energy-efficient and climate-friendly manner. In Germany, the market share of erected residential and non-residential buildings made of wood is 16% overall, and regionally as high as 30% in Baden-Württemberg. Generally, wood and wood-based materials belong to the normally flammable building materials that are used in different ways. In particular, the use of these materials in exterior applications according to the 2002 model building code for the higher building classes poses a major challenge in terms of flame retardancy. Depending on temperature and humidity, the material shrinks or swells. To improve fire protection, the wood surfaces must be coated with an intumescent varnish that will not be destroyed during dimensional changes. At the same time, the flame retardants used in the varnish must not be washed out. Currently, there is no solution for decorative exterior wood surfaces that guarantee satisfactory flame retardancy. In addition to the flame retardant requirements, the decorative wood appearance should not be compromised at any way.
Therefore, the economic importance of developing efficient and durable flame retardant finishes, especially for wood processors (usually companies with small and medium-sized structures), is very high. There is a need for new, effective and above all halogen-free finishes, as many known systems have to be replaced due to the expected ban of halogen-containing flame retardants and the flame retardant requirements for furniture and building materials are increasing.
The aim of this research project, in cooperation with Fraunhofer institute for wood research, is to develop innovative and non-toxic flame retardants based on phosphorus- and nitrogen-containing silanes and on cyclophosphazene derivatives for single-step fire retardant coatings in the field of decorative wood surfaces. In addition to the flame retardant requirements, these flame retardants should simultaneously exhibit an intumescent effect, and achieve a corresponding weathering resistance. The use of these flame retardants reduces the environmental risk of releasing harmful substances.

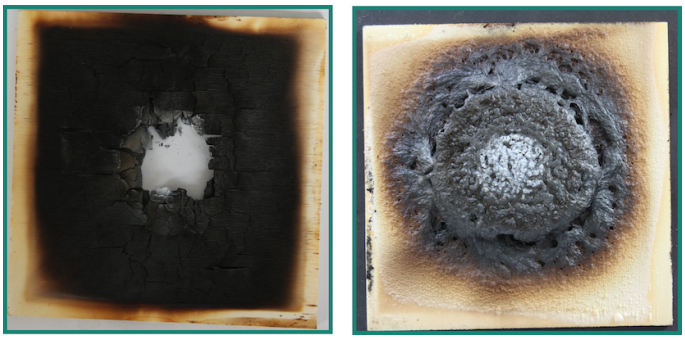

Figure 1: Results of Fraunhofer WKI's own fire test on untreated plywood (left, test time = 3 min.) and plywood with an intumescent coating (right, test time = 13 min.).

Project Information:

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