Smoke-suppressing flame retardants for natural-fiber composites – Boron-based FRs (Bor-FRs)

For many flame-retardant applications, not only good fire resistance is needed, but also reduced smoke formation. This is especially required in public buildings and in many mobility areas. To achieve this, boric acid and its salts, such as zinc borate, have proven to be very effective. The effect is based, first, on the fact that boron can form a glass-like layer and thus creates a protective coating on the material surface. Second, it supports the formation of char from organic compounds. Boron is a trace element; however, animal tests with very high doses of boric acid have shown toxic effects on reproduction. For this reason, boric acid has been listed under REACH. Alternatives to boric acid include boronates, boron-carbon compounds (B–C), or boron-nitrogen compounds such as boron nitride (B–N). The demand for new, effective, and halogen-free flame retardants is high, because established systems need to be replaced and, at the same time, fire-safety requirements for textiles and textile-based composites are increasing. In the planned research project, the patented flame retardants and their use for natural-fiber composites will be validated. A key goal is to show that different fire-safety requirements can be met, for example for rail transport (DIN EN 45545-2) or for building materials (DIN EN 13501-1).

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