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Development of a Foamed Thermoplastic Substrate for Novel Printed Circuit Boards

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Thermosetting printed circuit boards (PCB) for electronic applications require the use of toxic flame retardants, mostly halogen-based additives such as tetrabromobisphenol A, and must therefore be treated as hazardous waste. Thus, a procedure was developed in order to continuously manufacture novel printed circuit boards made of intrinsically flame-retardant high-temperature thermoplastic foams. The presentation will demonstrate the successful implementation of this approach for the production of flexible and light-weight thermoplastic alternatives to the commonly used thermoset-PCBs.
Systematic investigations of the foaming behaviour of suitable high-temperature thermoplastics have revealed that the foam cell morphology of polyetherimide as a candidate polymer depends on the processing conditions during the continuous extrusion foaming. Such thermoplastic substrates can be foamed with halogen-free blowing agents in order to save weight and to reduce the production costs. Compounding, foaming and fabrication of an A-B-A-sandwich with a solid surface coating and a foamed core were realised by a specially designed extrusion line. The extrudates can withstand the thermal demands of the soldering process, reveal excellent electrical properties, especially with regard to high-frequency applications, show excellent flame retardancy and are shapeable in three dimensions.