Editorial corner – a personal view

Trends in fiber reinforcements – the future belongs to basalt fiber

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Technical advances are very fast in the field of plastics – this is especially true for fiber reinforced composites. Nowadays the typical reinforcement of polymer composites is glass fiber, which exhibits good mechanical properties, high strength, and a relatively low price. In more demanding applications, in order to meet special requirements carbon fiber reinforcement is used but its production is much more expensive. Hybridization of these two fibers is a frequently used solution, which combines the advantages of both fibers (e.g. in the manufacture of wind turbine blades). Due to the ever stricter environmental regulations natural fibers (e.g. flax, hemp, sisal, wood) become more and more popular. These fibers combine acceptable strength with relatively low price and biodegradability.

Taking into account the sharp competition and the growing economic and environmental expectations with respect to the reinforcements used in plastic structures, newer potential reinforcements are studied for applicability in the leading laboratories of the world. Such a new, possible reinforcement is, among others the basalt fiber, made from a volcanic rock found on the surface of the Earth's crust (containing 40–60% SiO_2), and these fibers exhibit a series of excellent properties. In addition to their high modulus and excellent heat resistance, the heat and sound insulating properties and the vibration dampening properties of these fibers are extremely good. Biological stability and chemical resistance are further bonuses. Basalt fibers are typically produced by two technologies. The so-called Junkers

technology with centrifugal cylinders is used for manufacturing cheap fibers with 60–100 mm length and 8–10 μm thickness, primarily used as insulating materials in the construction and automotive industries.

For more demanding applications continuous fibers, which can be weaved and spun by textile technologies, are prepared by fiber spinning technologies from the melt – similarly to traditional glass fiber production. These continuous fibers of 10–12 μm diameter can be obtained in the form of rovings containing different numbers of elementary fibers, which exhibit somewhat better strength than glass fibers, but their price is presently 10–20% higher. The application of these very high quality fibers has already been started in both thermoplastic and thermoset matrix composites. Therefore, it can be predicted that basalt fibers may become a future alternative for skin irritating glass fibers and for asbestos fibers already banned because of their carcinogenic properties, not only owing to their excellent properties but also as a result of their continuously dwindling price.

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