Editorial corner – a personal view

How green are green polymer composites? (Any chance to define the level of ‘greenness’?)

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Growing environmental awareness of mankind is becoming a key factor which influences the selection of goods and products of their consumers. Obviously, this has a strong influence on the whole value chain of manufacturing from feedstock to waste disposal.

Based on marketing strategies environmental friendly products are labelled by green, eco, renewable, sustainable, pollution-free, carbon-neutral, ecologically friendly, clean attributes, and the like. Different definitions are introduced also for green polymer composites. Composites containing only reinforcements from renewable resources (e.g. natural fibres) are referred to as green as those comprising both bio-based resins and fibres. Is there any possibility to define, or to estimate the level of ‘greenness’? The most promising way to answer this question is to adapt the life cycle analysis (LCA), commonly termed as to ‘cradle-to-grave’ analysis. LCA is foreseen to evaluate every eventual impact caused by the manufacturing, processing, use and disposal of a given product. In the meantime, LCA is well established to evaluate composite parts, especially when traditional materials are replaced by polymer composite ones. Results of the analysis, however, may vary whether the outcome is optimized for different targets, such as global warming potential, solid waste amount management, etc.

Interestingly, LCA studies are seldom performed on natural fibre reinforced composites. Accordingly,

limited information is available on how plant cultivation, transformation of the plant to fibres (transportation, retting, fibrillization, follow-up treatment...) affect the greenness of the related product. This is, however, a critical issue due to the expected growth of green polymer composites in the automotive sector. The end-of-life directives on vehicles, introduced in the European Union and Japan, force the involved parties to make their homework. In this respect, LCA should cover effects of biobased polymer matrices, as well. LCAs sometimes are performed from cradle-to-gate, i.e. to the gate of the composite part manufacturing site. Nonetheless, even such shortened analyses would help to pinpoint how the corresponding polymer composites can be made ‘greener’. And what is about to extend it for a cradle-to-cradle process when possible? Is it not a challenging task worth of working on?

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