

Editorial corner – a personal view

Natural fibre reinforced polymer composites – are short natural fibres really reinforcements or just fillers?

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Past research on natural fibre reinforced polymer composites, focused on the more well-known fibres e.g. wood, sisal, flax, hemp, jute, etc., but nowadays fibres are extracted from a large number of different plants. It is well-known that there is little interaction between untreated natural fibres and most synthetic polymers, and therefore fibre treatment, polymer modification and compatibilization have been investigated as means to improve polymer-fibre interaction to form an interphase that will induce effective stress transfer between the polymer and fibre.

When polymers are reinforced by long cellulosic fibres or fibre mats combined with effective treatment/modification of the fibre and/or polymer, most mechanical properties are significantly improved. This is, however, not necessarily true for polymers that are mixed with short fibres. Most publications that reported results on the properties of polymer composites containing untreated and treated short fibres, or on the influence of polymer modification or compatibilization on the composite properties, agree that treatment/modification/compatibilization generally improves polymer-fibre interaction with resultant improved mechanical properties. In many cases the reported properties were still worse than those of the neat polymer.

A number of papers, however, report considerably improved properties after polymer and/or fibre treatment. Many of these results are claimed to be

related to transcrystallization of the polymer on the fibre surface as a result of the stronger interaction between the modified polymer and/or the treated fibre. There are, however, controversial views on the relationship between the thickness of the crystalline layer on the fibre surface and the effectiveness of stress transfer, and on the relationship between the extent of polymer crystallinity and the morphology of the interphase. Both these effects will determine whether there will be an improvement in mechanical properties, and whether the fibre may be regarded as a reinforcement of the polymer matrix. In many of the investigated systems, the treatment/modification/compatibilization is not effective enough in the creation of an interphase with the right lamellar architecture, and in these cases the fibre does not reinforce the polymer, but only act as a filler.



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