

Black flakes with green value proposition – graphene polymer composites for sustainability

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Since the discovery of graphene and its impressive mechanic, thermal and electrical properties, major materials research efforts have been made towards harnessing these properties for the development of polymer composites with unprecedented performance. While this research has shown that some of the bolder expectations for their properties will probably not be achievable for reasons from basic physics, substantial progress has been made in the production of composites with more down-to-earth property improvements.

At the same time, the production of graphene related materials (GRM) has made great progress with respect to available quantities, cost and resource efficiency that pragmatic applications of graphene as just another functional filler for polymer composites has become economically and ecologically viable.

The value proposition of graphene in applications flame retardance, thermal conductivity or mechanical reinforcement may not lie in beating the performance of conventional fillers in these fields but in avoiding negative side effects of the conventional fillers such as

- introduction of “foreign” elements into the polymer
- embrittlement of the material by large volume fractions of filler
- increase of density due to large fractions of inorganic fillers
- abrasive properties of the melt

While such properties are not necessarily “flashy”, they nevertheless may greatly help the polymer industry on the way of to a more circular and resource-efficient economy