
Abstract

The objective of this study was to evaluate the influence of graphene masterbatch incorporation on the properties of finished polypropylene fibers, including linear density, tenacity, elongation, and elastic modulus, as well as on the mechanical and physical properties of the final fiber cement product.

A study was conducted incorporating 0.5% and 1.0% graphene masterbatch dispersed in polyethylene resin, as well as 0.5% and 1.0% graphene masterbatch dispersed in polypropylene resin, both used in the production of polypropylene (PP) fibers intended for fiber cement applications.

The results showed that PP fibers containing graphene masterbatch exhibited lower elongation and an increase in the elastic modulus compared to the reference fibers. No improvements were observed in the other fiber properties evaluated. Regarding the final fiber cement product, pilot-scale testing indicated slight improvements in mechanical properties, particularly for the material containing graphene masterbatch dispersed in polyethylene resin. The results of the industrial-scale fiber cement production trial showed a slight improvement in the mechanical properties, as well as at the pilot scale.

Further work will be carried out to investigate whether higher graphene masterbatch loadings in polypropylene fiber production can improve fiber performance, especially by increasing tenacity, and promote more significant enhancements in the finished fiber cement product, particularly in its mechanical properties. In this way, it will be possible to quantify the potential enhancement in the fiber–matrix interaction.
