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Biocomposites reinforced with nanocellulose/graphene hybrid nanofillers

Sarah Montes¹, Germán Cabañero¹, H Grande¹, Jalel Labidi² and Ibon Odriozola¹¹IK4-CIDETEC, Spain²University of the Basque Country, Spain

In the last few decades, the development of green composites has gained increasing attention, mainly due to the global awareness of environmental issues. This fact has resulted in the emergence of sustainable and environmentally friendly green materials, which are renewable, recyclable or biodegradable. Cellulose is considered the most abundant renewable polymer on Earth. Nanostructures such as microfibrillated cellulose (MFC) and cellulose nanocrystals (CNCs) can be extracted from this naturally occurring polymer by mechanical and chemical methods, respectively. CNCs have been extensively investigated in the preparation of polymer biocomposites, especially those based on biodegradable polymers, due to their good mechanical properties and reinforcing capability, abundance, low weight and biodegradability. As well as reinforcing nanomaterial, CNCs have been recently reported to effectively stabilize graphene aqueous dispersions prepared by liquid phase exfoliation of graphite, obtaining a nanocellulose-graphene hybrid nanomaterial. This hybrid nanomaterial was used in the preparation of green composites based on two different polymeric systems. On the one hand, a hydrophilic matrix such as polyvinyl alcohol, PVA, in which the biocomposite was prepared by direct incorporation into PVA of, previously exfoliated graphene with cellulose nanocrystals. As a result of the combination of graphene and nanocellulose in PVA, a synergistic effect was obtained. On the other hand, a fully bioderived green composite based on polylactic acid, was also prepared. The investigation of the optical, thermal and mechanical properties of the new green composites will be presented.

Biography

Sarah Montes has got her degree in Polymer Chemistry and has done her Master's in Applied Chemistry and Polymers from the University of The Basque Country. Currently, she is a Scientific Researcher at IK4-CIDETEC, specialized in the development of polymeric composites/nanocomposites, especially bio-based polymers and in the characterization of polymeric materials. She has been the Coordinator of the ECLIPSE European Project. She is the author and co-author of 5 scientific papers and 2 patents.

smontes@cidetec.es

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