Interfacial localisation of reactive reduced graphene oxide in the immiscible polystyrene/polylactic acid blend

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Incorporating inorganic nanoparticles into immiscible polymer blends provides a route to combine different properties of thermodynamic incompatible materials. This approach has practical applications, such as reinforcing the interface and improving mechanical and electrical properties with reduced levels of additives. The localisation of graphene at the interface is known, however, controlling the localisation has proved challenging as it strongly dependent on blending parameters[1,2]. Compatibilization of immiscible blends by Reactive extrusion of different nanoparticles, including carbon nanotubes, has proven to be successful[3,4]. Here we will discuss the synthesis of reduced graphene oxide (RGO) containing both epoxy groups and polystyrene chains and reaction with polylactic acid chains during melt compounding. We demonstrate that the chemically modified RGO is preferentially located at the interface of the blend and a compatibilization mechanism is proposed.

References

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[3] H. Wang, X. Yang, Z. Fu, X. Zhao, Y. Li and J. Li, Macromolecules, 50 (2017) 9494–9506
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Figures

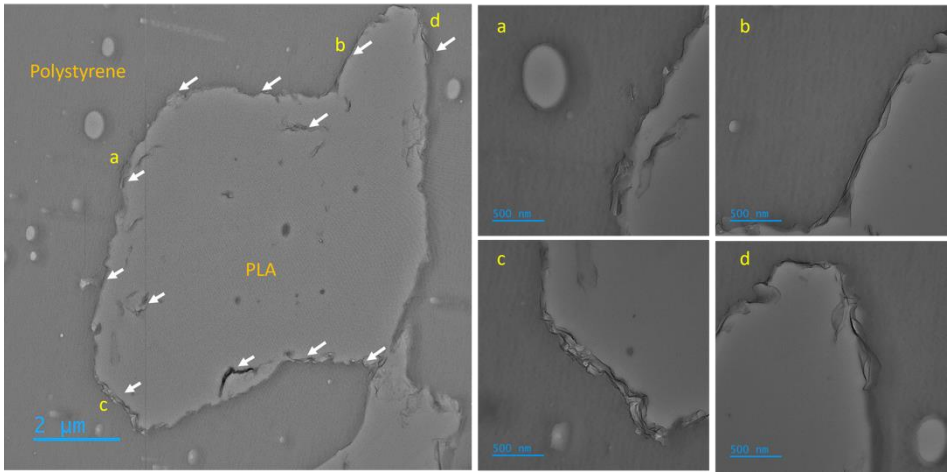

Figure 1: Transmission Electron Microscopy (TEM) image of an ultramicrotomed sample with 3wt % reactive graphene oxide showing its interfacial localisation.