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Effect of Particle Dispersion on the Properties of Polylactide(PLA)-clay Nanocomposites by Melt Intercalation

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PLA-clay nanocomposite has been prepared by melt intercalation of PLA and organically modified montmorillonite clay(OMMT). In order to characterize particle dispersion, interparticle distance and numbers of stacked silicate layers of OMMT were determined respectively by transmission electron microscopy and X-ray diffraction. It was shown that for the intercalation process, Na⁺ residual quantity of OMMT gave a significant effect in peeling of the silicate layers of OMMT. Dynamic viscoelastic properties of the samples were measured, and it was shown that when the OMMT particles were dispersed within 80nm distance, the modulus of the composite increased due to suppressing the motion of the polymer chain by OMMT. In addition, DSC measurement was carried out and crystallization kinetic constant (k) and Avrami number (n) were obtained. It was shown that OMMT would act as crystal nucleus agent, and the crystallization kinetic of PLA nanocomposite was more promoted in comparison with the neat PLA.