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Mechanical and rheological analysis of biodegradable PLA/natural rubber blend with nanoparticles

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Poly(lactic acid) (PLA), as an aliphatic polyester chemically synthesized from bio-derived monomers, is biocompatible and biodegradable. Different from other biodegradable polyesters, it is thermally stable which promises a great processability for industrial applications. However, its brittleness limits its usage. it is usually toughened with more ductile elastomer like polyurethane, rubber. In this study, natural rubber (NR) was added to toughen PLA and also nanoparticles were mixed in order to improve mechanical properties. In this case, the blend composition of two polymers was widely changed. As the composition increases, the polymer blends show interpenetrating structure of two polymers, which is expected to bring a large change in properties compared to other morphology like droplet/matrix. Since polymers are usually immiscible with low interfacial adhesion, its system is often unstable. So several factors like nature of polymers (interfacial tension, viscosities, ratio of viscosities), their volume fraction, processing conditions must be in consideration. With a fixed composition of NR, different types of nanoparticles were introduced with a small amount of weight fraction $W_{particle}$ to see their rheological and mechanical effect. With a small, $W_{particle}$ PLA/NR system showed different morphological change under FE-SEM images and this was reflected on rheological and mechanical properties.

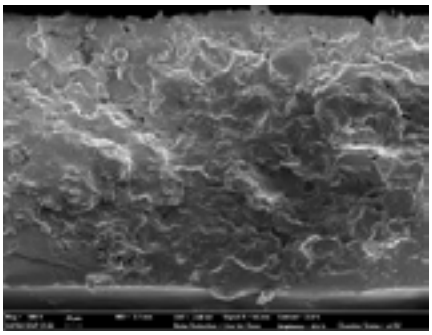

Figure 1. FE-SEM images of PLA/NR blend with nanoparticles.

Biography

Jung Hyun Ahn currently on a master's degree in mircorheology lab in Seoul National University since 2016. He is studying polymer melts and its blend, composite system with different types of filler. Also he is working on the effect of external field like electric field on polymer nanocomposites.

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