

Response of polypropylene/clay and poly(lactic acid)/clay nanocomposites to electric field

옥현근, 안경현*
서울대학교
(ahnnet@snu.ac.kr*)

Electric field was found to facilitate the destruction of layer stacking and separation of silicate layers in polypropylene/clay nanocomposites even without compatibilizer. To apply this concept to manufacturing of polymer/clay nanocomposites, we investigated the response of nanocomposites to electric field, with various combinations of polymer matrices and clays. Three kinds of modified clays (Cloisite 10A, Cloisite 20A, Cloisite 30B) were compounded with two different polymers (poly(lactic acid) and polypropylene). According to the molecular structures of polymers and organic modifiers of clays, the reactivity of polypropylene/clay was in the order of C20A, C10A and C30B, while the reactivity of poly(lactic acid)/clay was in the opposite order. Solubility parameter was introduced to explain this result. The structural development was observed during the dynamic time sweep test with the application of electrical field and the resulting structure was confirmed by the frequency sweep test. The extent of rheological responses to the electric field was different depending on the combination of polymer matrices and clays. The best combinations were poly(lactic acid)/Cloisite 30B and polypropylene/Cloisite 20A nanocomposites.