

## MORPHOLOGY AND MECHANICAL PROPERTIES OF PHYSICAL BLENDS OF P(L)LA AND PBSL BIODEGRADABLE POLYESTERS

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Recently, a new type of aliphatic copolyester poly(butylene succinate-co-lactate) PBSL, (trade name: GS Pla) was developed and commercialized. Although the conventional poly(butylene succinate) PBS is chain-extended by hexamethylene diisocyanate, PBSL does not contain the isocyanate-based unit. The monomers for the synthesis of PBS are succinic acid, 1,4-butanediol, and L-lactic acid, all of which can be derived from renewable plant-resources since succinic acid can be prepared by fermentation of starch, and then be converted to 1,4-butanediol by hydrogenation. This work focuses on the blending of two commercial polyesters PBSL and polylactide P(L)LA in order to evaluate blend impact strength / Young moduli ratio over the one of the pure components. For those two polyesters were melt-blended using a twin-screw extruder and subsequently injection moulded. Mechanical properties and morphology are reported. Interactions between amorphous phases, crystalline phases and in the melt are studied using DSC, WAXS, DMTA and ARES. Finally, trans-reactions are estimated using IRTF and <sup>1</sup>H and <sup>2</sup>C NMR spectroscopies. The mechanical properties showed significant improvements in elongation at break over that of individual polymers while impact strength was improved as compared to pure P(L)LA. Melting point depression indicated thermodynamic interactions between the blend constituents, while immiscibility could be inferred from Microscopy observations, Differential Scanning Calorimetry and Wide Angle X-ray Diffraction. Dynamic Mechanical Thermal Analysis showed all blends had two T<sub>g</sub>s at positions close to the pure components. However, a shift in the tan( $\delta$ ) peak position suggested partial miscibility of PBSL in P(L)LA rich phase. This phenomenon was maximal for blends with high PBSL contents. Melt miscibility was also highlighted by melt viscosity for blends having high PBSL contents.