# Prediction of the Gas Permeability Property of Poly (lactic acid)/ Poly (butylene succinate) (PLA/PBS) Nanocomposites

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Prediction of the Gas Permeability Property of Poly (lactic acid)/ Poly (butylene succinate) (PLA/PBS) Nanocomposites Rahul K Gupta*, Sati N. Bhattacharya Rheology and Materials Processing Centre, School of Civil, Environmental and Chemical Engineering, RMIT University, Melbourne, Vic 3001, Australia *Corresponding Author : rahul.gupta@rmit.edu.au Fax: +61-3-9925-2086 ABSTRACT PLA/PBS/Cloisite 30BX (organically modified MMT) clay nancomposites were prepared by using simple melt extrusion method. Composition of PLA and PBS polymers were fixed as 80% and 20% by weight for all the nanocomposites. Nanocomposites containing 1, 3, 5, 7 and 10 wt% of C30BX contents were prepared to investigate the effect of clay content on morphological, rheological and thermal and gas barrier properties of these nanocomposites. Gas permeability, morphological, rheological, thermal properties of nanocomposites prepared with the mixing of poly (lactic acid) (PLA), poly (butylene succinate) (PBS) and organically modified layered silicate were investigated. From morphological studies using wide angle X-ray diffraction (WAXD) and transmission electron microscopy (TEM), nanocomposite having 1 wt% of clay was considered to attain mixed morphology of intercalated and exfoliated structure, while some clusters or agglomerated particles were detected for nanocomposites having 3 and more than 3 wt% of clay content. Gas barrier properties were measured for oxygen and water vapours. Oxygen barrier property improved significantly as compared to water vapour. A model based on gas barrier was used for the validation of oxygen relative permeabilities of PLA/PBS/C30BX nanocomposites. Keywords: poly (lactic acid) (PLA); poly (butylene succinate) (PBS); nanocomposites; morphology; barrier properties; gas barrier model