



## Biodegradable film based on plasticized PLA–PHB/chitin nanocrystal blend for food packaging applications

Mitul Patel<sup>1\*</sup>, Marta Zaccone<sup>2</sup>, Kristiina Oksman<sup>1,3</sup>

<sup>1</sup>*Division of Materials Science, Department of Engineering Sciences and Mathematics, Luleå University of Technology, SE-97 187 Luleå, Sweden*

<sup>2</sup>*Proplast, Via Roberto di Ferro 86 , 15122 Alessandria, Italy*

<sup>3</sup>*Mechanical & Industrial Engineering (MIE), University of Toronto, Toronto, ON M5S 3G8, Canada*

\*mitul.kumar.patel@ltu.se

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### ABSTRACT

Both poly(lactic acid) (PLA) and poly(hydroxybutyrate) (PHB) are biobased biodegradable polymers with similar melting temperatures, therefore, they can be blended in the melt state to form a new biodegradable material that combines the advantages of both polymers. It is reported that PHB enhances the crystallinity of PLA[1], as well as PLA can significantly improve the mechanical performance of PHB[2]. It has been reported that the best synergic effect is achieved by blending PLA and PHB in 75 wt% and 25 wt% ratios, respectively[3]. As a result, melt blending PLA with 25 wt% PHB has gained a special interest in the development of films for the food packaging sector. In this study, plasticized PLA-PHB based bionanocomposite film intended for food packaging was prepared using liquid-assisted extrusion and blow film extrusion. Firstly, masterbatch pellets were prepared by mixing PLA and PHB in 75:25 ratio respectively using twin-screw extruder. The blend was then reinforced with 1 wt% ChNCs using an oligomeric lactic acid (OLA) plasticizer which improves the dispersion of ChNCs in the matrix while also providing flexibility to the film. The thermal stability of the PLA–PHB blends was improved by the addition of ChNCs. The combination of OLA and ChNCs, improved the interaction between PLA and PHB, hence the improvement on the oxygen barrier along with better mechanical properties and stretchability was achieved in PLA–PHB–OLA–ChNCs. The obtained film showed complete disintegration in compost in 45 days, indicating their possible applications as biodegradable food packaging materials.

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