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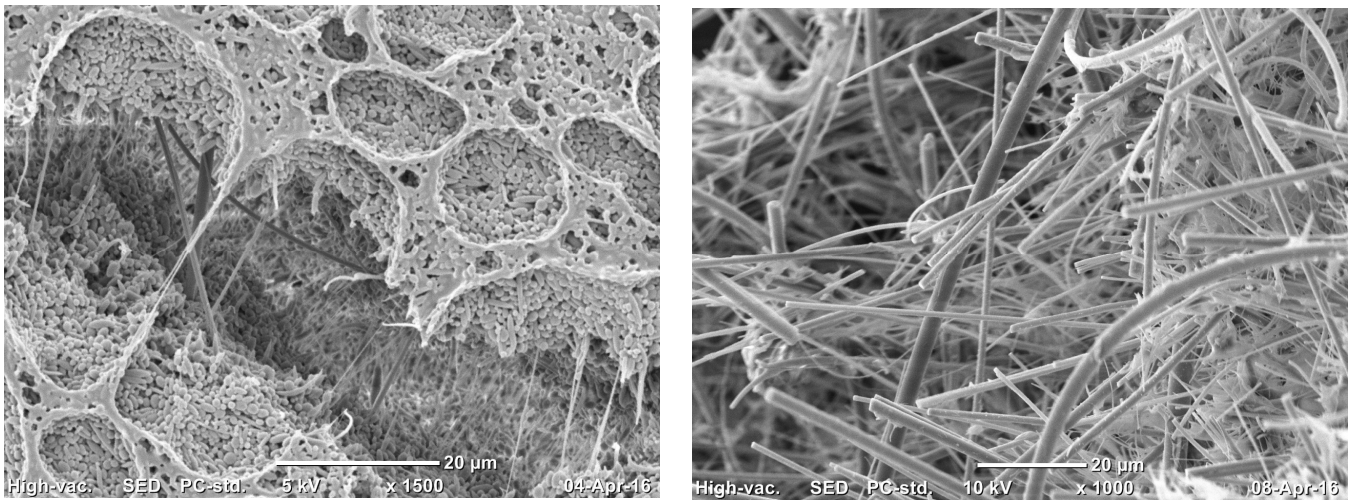
Abstract:

Microfibrillar polymer / polymer composites constitute a particular kind of multiphase polymeric materials in which the minor phase is in the form of filaments dispersed in the continuous phase and behave like fibrillar meltable solid particles. Compared to traditional composites, the polymer/polymer composites are light weight recyclable materials. However, the achievement of the microfibrillar structure requires the respect of a number of conditions. In particular, the two polymer components forming the blend should have appropriate rheological characteristics, allowing the formation of reinforcing fibrils [1]. In the flow conditions, the viscosity and elasticity ratios between the dispersed phase and the matrix should be suitable. In this study, bio-based PLA/PA11 80/20 w/w blends with and without a reactive chain extension agent (CE, 0.5 and 1wt%) were prepared by melt extrusion (at 200°C) followed by injection molding (at 180 °C, just below the melting temperature of PA11) using an injection molding apparatus. The effect of the matrix elasticity on the morphology and rheological properties of resulted microfibrillar blends was highlighted. SEM analysis showed that the morphology of the blend was predominantly nodular or totally fibrillar without and with the CE agent respectively. The results showed also a significant increase in the viscosity and elasticity of the blends prepared in the presence of the chain extension agent. On the other hand, the ductility increases compared with pure PLA (with an elongation at break greater than 80% against only 10% for neat PLA), without scarifying meanwhile the stiffness [2].



Left (PLA)/(PA11)) extrudate and **right** (PLA+1% chain extension agent) /(PA11) extrudate after dissolving PLA matrix.

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[2] B.J. Rashmi et al., Toughening of poly(lactic acid) without sacrificing stiffness and strength by melt-blending with polyamide 11 and selective localization of halloysite nanotubes. Express Polymer Letters, 9(8), 721–735, 2015