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## Sorting natural fibres: A way to better understand the role of fibre size polydispersity on the mechanical properties of biocomposites

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### Abstract

Wheat straw fibres (WSF), obtained by successive dry grindings, were sorted by air-classification to produce two fractions, *i.e.* coarse fibres cleared from fines, allowing to investigate the impact of size polydispersity on their reinforcing effect in polyhydroxy-(butyrate-*co*-valerate) (PHBV)-based composites. Composite materials filled with up to 30 wt% of both unsorted and sorted fibres were prepared by extrusion and structurally analysed. SEM pictures evidenced a better fibre/matrix adhesion in the case of fines, whereas crystallisation behaviour was not affected differently by the type of fraction used. The type of fibre did not significantly impact PHBV molecular weight. As regards tensile properties, no significant impact of sorting was noticed. Explaining this effect was difficult to gauge, as sorting affected, at the same time, fibre composition, size and aspect ratio, thus leading to competitive phenomena. The poor interfacial fibre/matrix adhesion was identified as the key phenomenon governing the mechanical properties of PHBV/WSF composites.

*Keywords:* A. Biocomposite; B. Mechanical properties; D. Microstructural analysis; E. Extrusion

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