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**Non-destructive characterisation of all-polypropylene composites using small angle
X-ray scattering and polarized Raman spectroscopy**

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ABSTRACT

Small angle X-ray scattering (SAXS) and polarized Raman spectroscopy were used to examine the structure of unidirectional all-polypropylene composites prepared at different consolidation temperatures. Analysis of the anisotropy of the X-ray scattering pattern provided a way to quantify the disorientation of the crystallites and a direct correlation has been found between a measure of overall orientation and the Young's modulus of the composites. In the case of the Raman spectroscopic measurements, the molecular orientation state of the reinforcing PP fibres were evaluated by classical least squares (CLS) modelling with real reference spectra. Strong correlation was evinced between the estimated relative degree of orientation of the reinforcing fibres and the Young's modulus of the multi-layered all-polypropylene composites. Based on these

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