Raman spectroscopy as a non-destructive tool for additive analysis in polyolefins.

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Raman spectroscopy is a fast and non-destructive technique widely used to study the chemical composition in material analytics. However its application in the field of polymer analytics especially polyolefins has been little explored. The high spatial resolution (down to less than 0.5 µm), fast measurement times and sensitivity to minor changes in the chemical structure makes it an accurate tool for solving complicated problems in analytics where other techniques such as IR spectroscopy are limited with regard to their special resolution (10 µm). This high resolution was used herein to detect the presence and distribution of the nucleating agent NU-100 in a polypropylene copolymer.

Distinct Raman spectra were obtained for both the nucleating agent and the surrounding polypropylene matrix while measuring through the sample, non destructively. These spectra were mapped over an area (1000 µm x 1000 µm) and the nucleating agent was observed as small agglomerates forming a circular conformation in the polypropylene matrix.

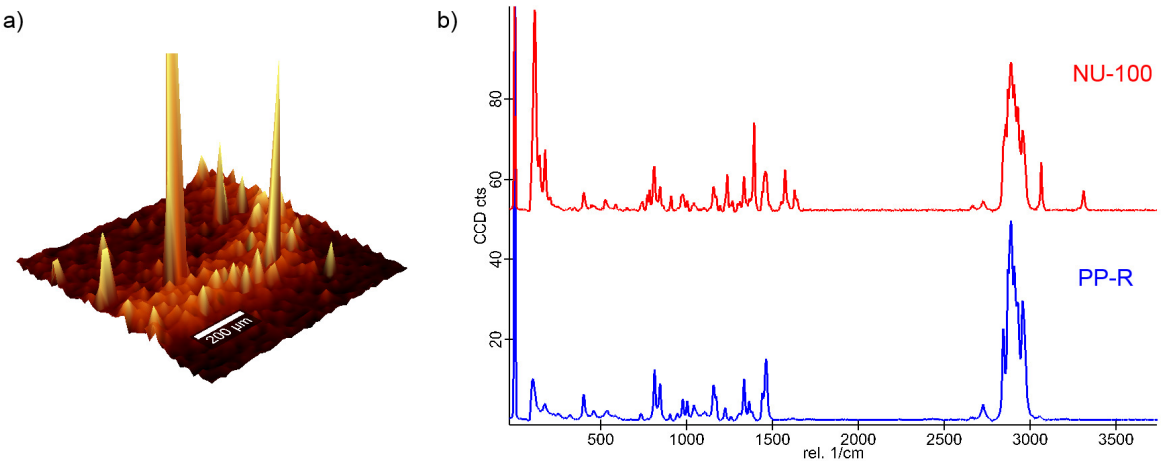

Figure 1: a) Distribution of NU-100 in the PP matrix (Intensity plot of the peak at 1394 cm-1, characteristic for NU-100). b) Raman spectra of NU-100 and the polypropylene matrix.