STRUCTURE CHARACTERIZATION OF POLYETHYLENE THEREPHTHALATE USING CONFOCAL RAMAN SPECTROSCOPY

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Polyethylene terephthalate (PET) is a semicrystalline polymer material which is used for many products in daily life, such as bottles and container materials [1,2]. Due to its inner structure it has favorable mechanical properties, which makes it usable in wide range of applications. For using PET as a tailor-made material, it is very important to know more about its microstructure. The microstructure can be very different according to the different types of PET. The former temperature history has a high impact on the microstructure of polymers [2]. PET changes its inner structure when the temperature is high enough [3], especially when the material contents a high stress potential caused by a high stretching rate. At the same time when the annealing temperature is close to the glass transition temperature (Tg) or higher (80-130°C) the orientation and crystallinity changes. State of the art is the usage of x-ray methods to investigate the changes of microstructures of polymers [3,4]. Using confocal Raman spectroscopy is a more suitable method to analyze these new structures. This study focuses on the analyzation of the inner structure of stretched and annealed PET samples with this technique. By using confocal Raman spectroscopy the intensity of structure related peaks on a defined area can be measured. The related peaks can be found at 1096 cm^{-1}, and 1730 cm^{-1} [5]. Additionally, by using polarized light in Raman spectroscopy symmetries of PET can be easier investigated. For example peaks at 1730 cm^{-1} and 1616 cm^{-1} can be easily identified as an orientation dependent peaks by using polarized light in Raman spectroscopy.

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