WG 3

Characterisation of chemo-enzymatic surface functionalised PET by fluorescence spectroscopy

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This paper reports on the characterisation of chemo-enzymatic surface functionalised poly(ethylene terephthalate) (PET)using fluorescence spectroscopy.Surfaces of crystalline and amorphous polyester films were hydrolysed using a lipolytic enzyme [1]. Contact angle measurements and FTIR analysis confirmed surface hydrolysis and the increase of hydrophilic groups in the surface of amorphous PET [1, 2]. The surfaces were functionalised by alkylation with 2-(bromomethyl)naphthalene (BrNP). Introduction with BrNP results in local increase of hydrophilicity as well as fluorescence of the surface [2]. The chemo-enzymatic surface functionalised PET samples were analysed using fluorescence spectroscopy. Photoluminescence emission and excitation spectra were recorded using a fluorescence spectrometer (wavelength range from 200 to 850 nm). The emission and excitation spectra of the surface modified PET films were measured with excitation and emission wavelengths of 350 and 440 nm respectively. The focused excitation beam fell onto sample under an angle of 45°, and the emission was monitored under an angle of 45°. The enzymatically modified PET films have increased opacity [3]. To evaluate the effect of increased opacity and scattering effects of the amorphous PET films as a result of the enzymatic treatment compared to the other treatments, the total photoluminescence intensity was measured using an integrating sphere. The samples were put inside the integrating sphere. The results are compared with photoluminescence measurementsin standard set-up. The results confirm that we can actually functionalise the enzymatically modified PET surface using fluorescent groups.

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