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Application of microbial levan as a new component for production of graft copolymer with polystyrene

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Polysaccharides based on fructose, also called fructans, are synthesized from sucrose by some plant species and many bacteria, fungi and *Archaea*. Levan is an exopolysaccharide composed of fructose units and has numerous applications in personal care and cosmetics, medicine and food industry^{1,2}. Polystyrene is the most widespread polymer for plastic production due to its low costing and easy production. Degradation of polystyrene is long-term process, therefore incorporating natural polymers is the desirable approach³.

In the present study, levan-polystyrene graft copolymer (L-g-PS) was synthesized, characterized and influence of reaction time on grafting reaction at two temperatures was investigated. Levan was isolated after cultivation *Bacillus licheniformis* NS032. Syntheses of L-g-PS were performed by the free radical reaction using K₂S₂O₈ as initiator⁴. Grafting reactions proceeded in nitrogen atmosphere, at 55°C and 70°C and reaction time ranged between 15 and 210 min. FTIR spectra and XRD patterns were recorded using a Thermo Nicolet 6700 Spectrophotometer and Philips PW-1710 automated diffractometer, respectively.

The formation of L-d-g-PS was confirmed by FTIR spectra which displayed the presence of all characteristic peaks for both component and X-ray diffractograms which showed amorphous nature of copolymer. Compared to other reaction parameters, the temperature of 70°C and time of 45 min was more optimal showing higher percentage of grafting.

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