Polymer thin film for immobilization of Laccase enzyme

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Immobilization of enzyme has become an important element of bioprocess development in recent years due to its high specificity and high activity under industrial conditions, where the biocatalysis is considered an efficient method of biotransformation[1,2]. This work reports the study of the immobilization of the Laccase enzyme on thin films of poly (maleic anhydride-alt-styrene), poly (maleic anhydride-alt-ethylene) and poly (maleic anhydride-alt-styrene) modified with L-glutamic acid (Figure 1). The thin films of polymers were prepared by spin-coating on previously treated Si-wafer. The surface modified with the different polymers studied was characterized by ATR-FTIR spectroscopy, AFM microscopy and contact angle measurements to obtain molecular characterization, morphology and wettability, respectively. The thickness of the surface was measured by Ex-Situ ellipsometry and ATR-FTIR. The Laccase enzyme was immobilized on the different polymeric films at pH 7. Studies of the activity of the Laccase enzyme were carried out by means of UV-Vis spectroscopy against a solution with persistent organic pollutants by means of.
The results show that the wettability (Figure 2) and morphology of the polymeric films are dependent on the comonomeric unit and on the presence of L-glutamic acid from the side chain of poly (maleic anhydride-alt-styrene). The thicknesses of the different polymeric films determined by ellipsometry are in agreement with those determined by ATR-FTIR. The activity of the Laccase enzyme immobilized on the surface of polymeric films depends on the hydrophobicity / hydrophilicity of the surface of the polymeric film.

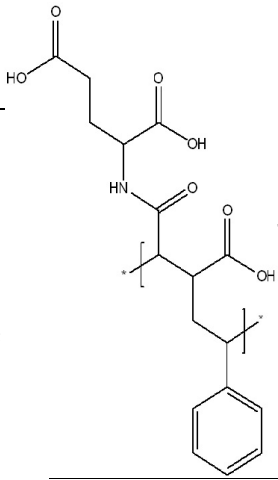

Figure 1: Poly(maleic anhydride-*alt*-styrene) modified with L-Glutamic Acid.

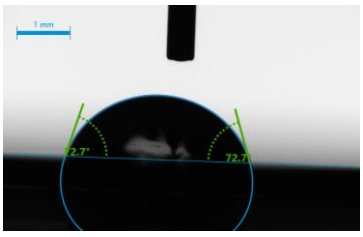

Figure 2: The contact angle for a drop of water on the modified polymer surface adsorbed in the previously treated surface (Silicon wafer)

References

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