CO-IMMOBILIZATION OF DIFFERENT LACCASE ENZYMES ON POLY(GLYCIDYL METHACRYLATE) MICROSPHERES FOR CARBOFURAN DEGRADATION

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Immobilization is a useful alternative to improve enzymatic properties [1]. In this work two different types of laccase enzymes were immobilized on polymeric microspheres of poly(glycidyl methacrylate) in order to obtain a biocatalyst, which is active at higher pH and temperature range, is reusable and has a better storage stability. For that, microspheres of poly(glycidyl methacrylate), P(GMA) were synthesized by dispersion polymerization, and used for covalent co-immobilization of *Trametes versicolor* and *Agaricus bisporus* laccases, based on the substitution reaction between epoxy groups in the support and amino groups of the enzymes. Finally, their capability of carbofuran degradation was analyzed.

The P(GMA) microspheres obtained by dispersion polymerization have a size-average of 2.85 μm and a narrow particle size distribution (PDI = 1.014 ± 0.166). These microspheres features make them the ideal solid support for laccase immobilization. Once synthesized the microspheres, simultaneous experiments of immobilization and co-immobilization were developed using the same conditions and protein concentration.

The results showed that co-immobilized enzymes appear to broaden the pH and temperature ranges, storage stability, reusability, and capacity of carbofuran degradation compared to immobilized and free enzymes. These aforementioned characteristics indicate that *Trametes versicolor* and *Agaricus bisporus* laccases co-immobilized on PGMA microspheres could act as an efficient biocatalyst in many biotechnological applications.

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[1] Kašpar, O.; Tokárová, V.; Nyanhongo, G. S.; Gübitz, G.; Štěpánek, F. Food Bioprod. Process. 2013, 91, 525–533.