

Accepted Manuscript

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PII: S0141-8130(17)30231-3
DOI: <http://dx.doi.org/doi:10.1016/j.ijbiomac.2017.03.169>
Reference: BIOMAC 7335

To appear in: *International Journal of Biological Macromolecules*

Received date: 17-1-2017
Revised date: 25-3-2017
Accepted date: 29-3-2017

Please cite this article as: Jiahong Lin, Qiujie Lai, Yingju Liu, Shi Chen, Xueyi Le, Xiaohua Zhou, Laccase – methacrylyol functionalized magnetic particles: Highly immobilized, reusable, and efficacious for methyl red decolourization, International Journal of Biological Macromolecules <http://dx.doi.org/10.1016/j.ijbiomac.2017.03.169>

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Laccase - methacrylyol functionalized magnetic particles: Highly immobilized, reusable, and efficacious for methyl red decolourization

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Highlights

- In this study, laccase was immobilized on the magnetic nanoparticles functionalized by siloxane layers with active acryloyl moieties.
- The amounts of laccase loading on the acryloyl functional magnetic microspheres were approximately 150 mg/g under the optimum conditions.
- Compared to free laccase, the immobilized laccase exhibited significantly higher decolourisation efficiency in the decolorization of methyl red, which resulted from the magnetic microspheres adsorption and enzymatic catalysis.
- The decolorization rates of methyl red by MPS-laccase retained more than 60% after 7 days continuous decolorization.

Abstract: Magnetically retrievable formulations of laccase potentially promising for biomedical and environmental applications were constructed by immobilization of the enzyme on the surface of magnetic nanoparticles functionalized by siloxane layers with active amino and methacrylyol moieties. The functional magnetic particles were prepared using a hydrolytic polycondensation reaction of tetraethoxysilane with 3-methacryloxypropyltrimethoxysilane (MPS). The results indicated that the amounts of laccase loading on the methacrylyol functional magnetic particles were approximately 150 mg/g under the optimum conditions. The stability of the immobilized laccase was highly enhanced against thermal treatments and provided better long-term storage.

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