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Study on recovery/recycling technology of glycosylated enzyme via magnetic nanoparticles integrated graphene oxide nanocomposites

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Recently the study on bio ethanol production technologies has emerged as an important issue to solve global warming problem. Among various bio ethanol production technologies, carbon dioxide (CO_2) reduction efficiency of lignocellulosic bio ethanol process is superior to agricultural feedstock-based bio ethanol procedure. However, production cost of cellulosic bio-ethanol process is usually higher than that of feedstock ethanol process due to additional procedure such as pretreating cellulose and glycosylated process. Especially, cost of glycosylated enzymes is accounted for 30-50% of the total costs for cellulosic bio-ethanol production and it has been pointed out as a problem hindering the commercialization. In this study, we successfully synthesized Mn-ferrite (MF) integrated graphene oxide (GO) and then glycosylated enzymes were covalently immobilized on the MF-GO nanocomposites by the EDC-NHS coupling reaction. During lignocellulosic bio-ethanol process, the glycosylated enzymes on the MF-GO were recycled by applying the external magnetic field and it could lead to reduce cellulosic ethanol production cost of approximately 40% after 5-times recycling glycosylated enzymes process. We believe that the present results allow us to explore economic method without development of special enzymes for increasing glycosylated yield.

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