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New method for waste oil biodiesel preparation: Enzymatic hydrolysis followed by chemical catalysis esterification

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In China, the major material for biodiesel production is waste oil and fat, which has high acid value. Traditional technology for producing includes two steps: Deacidification by acid catalysis and transesterification by base catalysis. For the use of liquid acids and bases, this way results in severe environmental pollution. The new technologies for biodiesel production include two kind of method, the catalysis way by solid acids/bases and the biocatalysis way by enzyme. However, there are some technical problems about the new methods. Firstly, there are no mature solid bases for the way by solid acids/bases catalysis. Secondly, lipase for biocatalysis is easily poisoned and inactivated by methanol. In our previous work, we have gained self-synthesized macroporous cation exchange resin as solid acid catalyst, which has high efficiency for the deacidification of fatty acid. Here, a new way for biodiesel preparation is presented after combining chemocatalysis with biocatalysis. It contain two steps. In the first step, triglycerides of waste oil and fat are hydrolyzed into fatty acids completely by lipase. In the second step, biodiesel is prepared by the fatty acids deacidification with our own solid acid as catalyst. During the process, enzyme need not touch methanol and other organic solvents and it can avoid inactivation by methanol. At the same time, the way can avoid the problem of base immaturation, the quality of by-product, glycerol will be improved obviously, the whole process is green and environmental. Immobilized lipase and solid acid can be used repeatedly, which will decrease the cost of biodiesel production.

Biography

Zhiyuan Wang has completed his PhD in 2010 from State Key Laboratory of Pharmaceutical Biotechnology, Nanjing University and worked for Biomass Institute of Energy Conversion Chinese Academy of Sciences as a Research Assistant. He is engaged in the study of biocatalysis and immobilization of enzyme. He has published more than 10 papers in reputed journals and has been serving as an review for some journals.

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