Improved sol-gel immobilization of enzyme using detergentless micro-emulsion system

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Sol-gel techniques have been used in order to effectively immobilize enzymes. Enzyme is encapsulated within a chemically inert sol-gel support prepared by hydrolysis and polycondensation of precursors. Currently used sol-gel immobilization methods contain drying and grinding steps or surfactant addition step. This method may bring about the protein denaturation or inactivation by lack of water content or the remaining surfactants on the enzyme. In this study, the detergentless micro-emulsion system was introduced. It is known that n-hexane/2-propanol/water are used to form stable detergentless micro-emulsion without any surfactant. For Horseradish peroxidase, the sol-gel immobilization method containing drying and grinding steps showed the initial loading activity of only 42%, the sol-gel method with surfactants showed the initial loading activity of 51%, in the case of immobilization by sol-gel method using detergentless micro-emulsion system showed initial loading activity of 84%. Laccase showed initial loading activity of 80% in this improved method. This immobilization method is simple and the activity of enzyme is high. And, the stability of HRP is also good. It can be used for many industrial enzyme.