S55-8 Development of revolutionary enzymatic-reactions in organic solvents with molecular display technology

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Enzyme reaction is carried out in mild and aqueous conditions and its selective reactivity and substrate specificity are attractive in the chemical reaction. However, in comparison with chemical catalyst, the potential function of enzyme has been lost in organic solvents because of the inactivation by the structural destruction. To overcome the disadvantages, immobilization and genetic modification of enzyme were performed and valid in organic solvents. Furthermore, to contribute enzyme reaction to the world of white biotechnology, revolutionary idea and techniques will be required. We have developed a revolutionary technology, Cell Surface Engineering, based on novel idea from post-genome analysis, and prepared whole-cell biocatalysts coupled with enzyme and living cell. This whole-cell biocatalyst has potentials of proliferation, preservation, and stability of enzyme and has prevailed the disadvantages of native enzyme. On the ther hand, this biocatalyst has realized the convenience and speedy preparation of enzyme mutant library to produce various chemical reaction library. The development with the enzyme reaction in organic solvents using molecular display of enzymes based on cell surface engineering will be promising and expected to contribute to the production of phamaceutical useful medicines and construction of sustainable society in the future. 1) Shiraga et al. Appl. Environ. Microbiol., 71, 4335 (2005); 2) Matsui et al., Appl. Environ. Microbiol., 74, 4222 (2008)