

Novel nanoporous TiO₂ electrode for electroenzymatic oxidation of 2-propanol

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Oxidoreductases are attractive catalysts for biosynthesis of fine chemicals, construction of biosensors, degradation of environmental pollutants, and so on. Their practical applications, however, often require cofactors such as nicotinamide adenine dinucleotide (NAD(H)) and nicotinamide adenine dinucleotide phosphate (NADP(H)). These cofactors are generally expensive. Therefore, efficient regeneration of cofactors is important for industrial applications. There are many methods to regenerate cofactor like enzymatic, chemical, electrochemical, and photochemical method. In this study, electrochemical oxidation method was used for cofactor regeneration. Alcohol dehydrogenases convert 2-propanol to acetone. Nanoporous TiO₂-coated FTO electrode was suggested and used in this study. Nanoporous TiO₂-coated FTO electrode has advantages: large internal surface area of an electrode to allow large amount of electrons to be contacted at the same time by TiO₂ electrode and an electrolyte. This experiment was conducted using both with a mediator (galloxyanin) and without a mediator electrode in anode compartment. Details will be presented.