Electroenzymatic synthesis of L-DOPA using tyrosinase

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Since 1960's, L-DOPA has been widely used as drug for Parkinson disease, neurological disorder which afflicts one out of every 1700 individuals and is caused by deficiency of neurotransmitter dopamine. L-DOPA is a precursor of dopamine and can pass across the blood brain barrier. About 250 tons of L-DOPA is now supplied per year and most of the current supply is produced by chmical synthesis. Because of the high production cost and its high commercial value, the alternative production of L-DOPA has been investigated; microbial and enzymatic production. In this study, L-DOPA was electroenzymatically synthesized using tyrosinase immobilized composite electrode. L-DOPA was synthesized by cresolase activity of tyrosinase. The serial oxidation of L-DOPA to DOPAquinone by catecholase activity of tyrosinase was prevented by electrical reduction. Compared to previous approaches for L-DOPA synthesis, electroenzymatic system showed high conversion rate and productivity 95% and 1500mg/Lh, respectively