Periplasmic Secretion of Organophosphorus Hydrolase to Increase Whole Cell Bioconverstion Efficiency

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Organophosphorus hydrolase (OPH) from *Pseudomonas diminuta* or *Flavobacterium* sp. is a homodimeric organophosphotriesterase that can degrade a broad spectrum of toxic organophosphates. The application of OPH for bioremediation is of great interest because of its high turnover rate. Recombinant *Escherichia coli* expressing OPH can degrade a variety of organophosphates. The ability of *E. coli* to grow into much higher cell densities than *P. diminuta* and *Flavobacterium* enables the development of large-scale detoxification processes. However, the whole cell biocatalyst expressing intracellular OPH has has a low production yield of OPH due to its very low solubility and mass transport limitations of substrates and products because the cell membrane acts as a diffusion barrier. Therefore, several strategies have been attempted to enhance OPH production yield or bioconversion efficiency such as insertion of multiple gene fusions, fusion with a soluble partner to increase solubility, and display on cell surface. In this research, we tried to direct OPH into *Escherichia coli* periplasmic space using the *pelB* signal sequence well known for potential periplasmic localization.