zymtronix™
NEXT WAVE BIOCATALYSIS

CASE STUDY

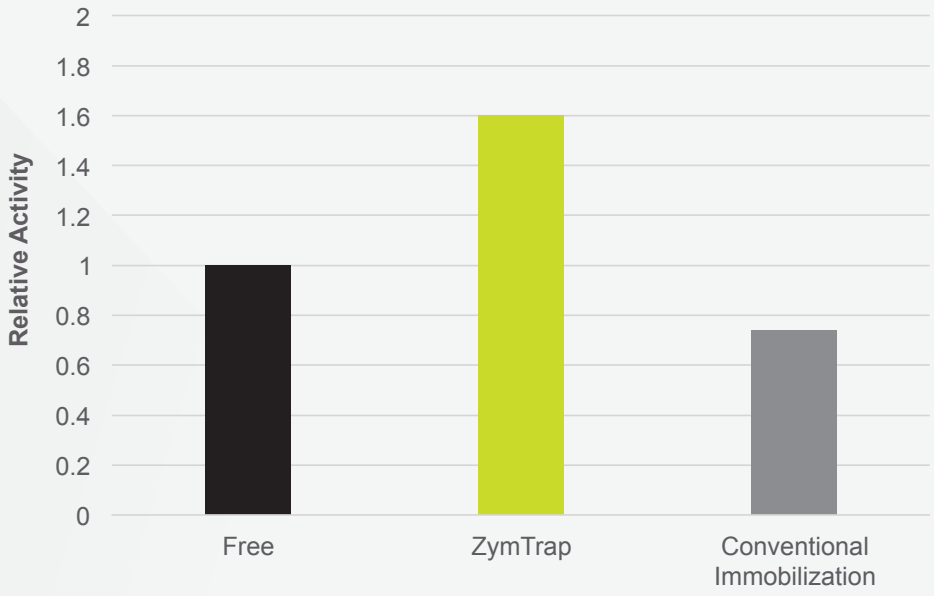
THE IMMOBILIZATION OF PEROXIDASES

3 IMMOBILIZATION OF PEROXIDASES

Peroxidases (EC 1.11.1.X) are oxidoreductase enzymes found in various organisms that catalyze the cleaving of peroxide compounds. They include lactoperoxidase, horseradish peroxidase, soybean peroxidase, chloroperoxidase, and versatile peroxidase (among others). Horseradish peroxidase is commonly used as a biochemical signal amplifier and tracer, as it usually acts on a color-producing substrate together with hydrogen peroxide to produce a brightly colored product complex, which improves detectability of the target molecule(s). More recently, horseradish and soybean peroxidases has been suggested as part of a possible remediation strategy of phenolic wastewaters due to its ability to degrade various aromatic compounds [1], [2]. Furthermore, lactoperoxidase is a natural antimicrobial agent, and chloroperoxidase is being investigated as a method to produce active pharmaceutical intermediates [3].

Using its ZymTrap™ system, Zymtronix has demonstrated 160% activity of a magnetically-immobilized peroxidase relative to its free counterpart (Figure 1) [4]. This case study highlights one of the advantages of the ZymTrap™ platform - enzyme activity may be enhanced significantly via protection of the enzyme from oxidative stress. [1] In comparison, a comparable perxidase immobilized on ordinary calcium alginate beads retained about 74% activity relative to free enzyme. [5].

Figure 1 - Peroxidase Performance



REFERENCES

1) Duan, X., Corgié, S. C., Aneshansley, D. J., Wang, P., Walker, L. P., & Giannelis, E. P. (2014). Hierarchical hybrid peroxidase catalysts for remediation of phenol wastewater. ChemPhysChem, 15(5), 974–980. **http://doi.org/10.1002/cphc.201300808**

2) Wright, H., & Nicell, J. A. (1999). Characterization of soybean peroxidase for the treatment of aqueous phenols, 70, 69–79.

3) de Hoog, H. M., Nallani, M., Cornelissen, J. J. L. M., Rowan, A. E., Nolte, R. J. M., & Arends, I. W. C. E. (2009). Biocatalytic oxidation by chloroperoxidase from Caldariomyces fumago in polymersome nanoreactors. Org. Biomol. Chem, 7, 4604–4610. **http://doi.org/10.1039/b911370c**

4) Corgié, S. C., Brooks, R. T., Chairil, R., Chun, M. S., Xie, B., & Giannelis, E. P. (2016). Universal enzyme immobilisation within hierarchically-assembled magnetic scaffolds. Chimica Oggi - Chemistry Today, 34(5), 15–20. Retrieved from **http://www.teknoscienze.com/wp-content/uploads/2016/09/corgie.pdf**

5) Pradeep, N. V, & Hampannavar, U. S. (2012). Polymerization of Phenol using Free and Immobilized Horseradish Peroxidase. Journal of Environment and Earth Science, 2(1), 31–37.