

## **Current development in decolorization of synthetic dyes by immobilized laccases**

### **ABSTRACT**

The world today is in a quest for new means of environmental remediation as the methods currently used are not sufficient to halt the damage. Mostly, a global direction is headed toward a shift from traditional chemical-based methods to a more ecofriendly alternative. In this context, biocatalysis is seen as a cost-effective, energy saving, and clean alternative. It is meant to catalyze degradation of recalcitrant chemicals in an easy, rapid, green, and sustainable manner. One already established application of biocatalysis is the removal of dyes from natural water bodies using enzymes, notably oxidoreductases like laccases, due to their wide range of substrate specificity. In order to boost their catalytic activity, various methods of enhancements have been pursued including immobilization of the enzyme on different support materials. Aside from increased catalysis, immobilized laccases have the advantages of higher stability, better durability against harsh environment conditions, longer half-lives, resistance against protease enzymes, and the ability to be recovered for reuse. This review briefly outlines the current methods used for detoxification and decolorization of dye effluents stressing on the importance of laccases as a revolutionary biocatalytic solution to this environmental problem. This work highlights the significance of laccase immobilization and also points out some of the challenges and opportunities of this technology.

**Keyword:** Immobilization; Laccase; Oxidoreductase; Textile dye wastewater; Decolorization; Detoxification; Biodegradation