BIOTRANS
LA ROCHELLE 2023

N°967 / PC
TOPIC(s) : Enzyme discovery and engineering

Screen-printed electrodes for the characterization of lignocellulose degrading enzymes

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PURPOSE OF THE ABSTRACT

Oxidative enzymes are a class of biocatalysts that catalyzes the oxidation of their substrate by electron transfers. Some of them are active on lignocellulosic biomass and can be used in biorefineries. For example, lytic polysaccharide monooxygenases (LPMO) can depolymerize crystalline cellulose and participate to reduce the cell wall recalcitrance while lignolytic enzymes can convert lignin into bio-based phenolic compounds[1-2].

Despite they offer the advantages to be bio-based, specific and active in mild conditions, enzymes need controlled pH and temperature to be efficient, that may be incompatible with industrial processes. One solution is to modify and/or discover new biocatalysts together with the development of measurement methods of the enzyme activity within industrial conditions.

Classical methods for the characterization of enzymatic activities usually require soluble artificial substrates bearing chromophores for spectrophotometric measurements. However, when polymers are used as substrate, these methods are not relevant (soluble and small artificial substrate vs natural substrate in heterogeneous media) and other methods such as liquid chromatography are preferred. Unfortunately, there are time and money consuming. This technological lock hinders the knowledge and consequently the development of biocatalysts efficient on solid substrate. For these reasons, an efficient method for a high throughput measurement of enzymatic activities is of interest. Electrochemistry represents an alternative method suitable for the measurement of electron transfers that occur in enzymatic reactions. Since several years, we are developing 96-well electrochemical methods dedicated to high-throughput screening[3-6].

In this work we describe the use of screen-printed electrodes for the characterization of oxidases involved in the degradation of lignocellulosic biomass.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS
electrochemistry | lignin | oxidases | lignocellulosic biomass

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