

Valve-jet printing of redox enzyme on polyester textile: a sustainable enzyme immobilization approach

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The resource-intensive preparation procedures and difficulty in free structure formation have restricted the widespread application of existing enzyme immobilization strategies. In this study, valve-jet printing as a resource-efficient process for robust immobilization of redox enzyme (Glucose oxidase-GOx) on polyester fabric support has been reported for the first time. For that, GOx enzyme has been directly printed on plasma-activated polyester fabric in a predefined pattern. Along with superficial analysis of the textile before and after the modifications, the loading, stability and activity of the immobilized enzyme has also been studied in details. The results indicated successful activation of polyester textile air atmospheric plasma treatment (O₂/N₂) through integrating carboxyl, amine functional groups. The enzymatic colorimetric analysis shows that most of loaded enzymes retained to their activity where few were inactivated due to blocking of their active site during printing. This study herein provides further proof of fundamental enzyme printing concept as a resource-efficient enzyme immobilization strategy for sustainable and green chemistry application.

Keywords: Valve, jet, Glucose Oxidase, Textile biocatalysts, Enzyme Printing and Polyester

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