

 Open access • Journal Article • DOI:10.1007/S00449-015-1432-5

## Enhancing enzyme stability and metabolic functional ability of $\beta$ -galactosidase through functionalized polymer nanofiber immobilization — [Source link](#)

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**Published on:** 24 Jun 2015 - [Bioprocess and Biosystems Engineering](#) (Springer Berlin Heidelberg)

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## **Enhancing enzyme stability and metabolic functional ability of $\beta$ -galactosidase through functionalized polymer nanofiber immobilization**

### **Abstract**

A functionalized polystyrene nanofiber (PSNF) immobilized  $\beta$ -galactosidase assembly (PSNF-Gal) was synthesized as a nanobiocatalyst aiming to enhance the biocatalyst stability and functional ability. The PSNF fabricated by electrospinning was functionalized through a chemical oxidation method for enzyme binding. The bioengineering performance of the enzyme carriers was further evaluated for bioconversion of lactose to galacto-oligosaccharides (GOS). The modified PSNF-Gal demonstrated distinguished performances to preserve the same activity as the free  $\beta$ -galactosidase at the optimum pH of 7.0, and to enhance the enzyme stability of PSNF-Gal in an alkaline condition up to pH 10. The PSNF assembly demonstrated improved thermal stability from 37 to 60 °C. The nanobiocatalyst was able to retain 30 % of its initial activity after ninth operation cycles comparing to four cycles with the unmodified counterpart. In contrast with free  $\beta$ -galactosidase, the modified PSNF-Gal enhanced the GOS yield from 14 to 28 %. These findings show the chemically modified PSNF-based nanobiocatalyst may be pertinent for various enzyme-catalysed bioprocessing applications.