

Preparation and characterisation of cyclodextrin glucoamylase enzyme immobilised in electrospun nanofibrous membrane

ABSTRACT

An industrial enzyme, Cyclodextrin glucoamylase (CGTase), was immobilised in polyvinyl alcohol (PVA) nanofiber (average diameter around 200 nm) membrane via co-electrospinning of the CGTase/PVA mixture followed with glutaraldehyde vapour phase cross-linking. Addition of enzyme with concentration ranging from 1.5 to 7.5 % to the PVA solution (8 wt%) caused significant changes to the liquid jet behaviours which consequently affected the nanofiber structures and sizes. Incorporation of CGTase in the PVA membrane was confirmed by Raman spectroscopic analysis. The Raman spectra also showed no structural changes occurred to the enzyme after subjected to the electrostatic spinning and cross-linking reaction. The immobilised enzyme showed excellent catalytic efficiency with up to 3.6 times higher enzyme loading, 25 % higher activity and good reusability in comparison with CGTase/PVA film made up from the same starting solution (control).