# ABSTRACT

The present study deals with the production of glucose oxidase from *Aspergillus niger* ISL-09 under solid-state fermentation and its entrapment in poly (acrylamide-co-acrylic acid) hydrogels for improved stability and catalytic efficiency. The best GOx activity (1.08±0.047 U/mg) was observed by using soybean meal as a substrate and improving different growth conditions. GOx produced under optimized conditions was then partially purified by ammonium sulfate fractionation method followed by dialysis and SDS-PAGE which confirmed a subunit molecular weight of approximately 80 kDa. To make GOx more stable and catalytically active, it was entrapped in poly (AAm-co-AAc) hydrogels under optimal conditions. The characterization of both pure and GOx-immobilized poly hydrogels was carried out by using different techniques. The UV-Vis absorption spectra of poly hydrogels didn't show any obvious peak while the FTIR spectra band at 1649 $cm^{-1}$ corresponded to the C=O groups and high intensity of carboxyl groups compared to the intensity of pure hydrogel suggested that GOx was entrapped in poly hydrogel with IPN networks. SEM micrographs demonstrated an obvious increase in the particle size of pure hydrogels after entrapment. Similarly, metallurgical microscopy clearly indicated different cross-linking patterns of AAm and AAc and the porous nature of poly hydrogels. However, both free and immobilized GOx was then used for industrial implementations. Immobilized enzyme exhibited 21.7% improved catalytic efficiency as compared to free one. This study revealed the remarkable potential of GOx to be used in the textile industry as a bleaching agent and in medicine as a potential producer of calcium gluconate.