

The incorporation of bovine serum albumin into a polypyrrole film in one simple step

Anita Hamilton, Carmel B. Breslin

Department of Chemistry, National University of Ireland

Maynooth, Maynooth, Co. Kildare, Ireland

e-mail: anita.hamilton@nuim.ie

The model protein, bovine serum albumin (BSA), was successfully incorporated into a polypyrrole film in one simple electropolymerisation step. The presence of the BSA within the polymer film was established using scanning electron microscopy, coupled with energy dispersive X-ray analysis (SEM and EDX); additionally, cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) were utilised to investigate differences between the polymer films in the presence and absence of the BSA and to determine the capacitance of the polymer films. It was found that the presence of BSA within polypyrrole reduces the electroactivity of the polymer film and has a fibrous surface morphology compared to the characteristic cauliflower morphology of PPy-Cl. However, the capacitance values for both the polymer films is high, in the region of 2.25×10^{-3} and 1.47×10^{-3} F cm⁻² for the PPy-Cl and PPy-BSA polymer films, respectively, which is typical of the high capacitance values recorded for conducting polymers. The low cost and simple method of immobilising the BSA within the polypyrrole film has many advantages in that the free NH₂ groups on the BSA may be used to immobilise enzymes or other proteins by cross-linking them to the BSA and hence, the PPy-BSA can be used for a wide variety of sensing applications.