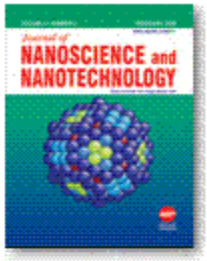

Fabrication of Al–TiO_2 Thin Film Electrode by Spray Pyrolysis Technique for Urea Sensing

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A simple cost effective Al–TiO_2 thin film electrode was fabricated for urea sensing. Urea is the key end product of nitrogen metabolism in humans. Increased level of urea leads to loss of kidney function. Thus determination of urea is important in analysis of kidney diseases. Al–TiO_2 thin films were deposited with different concentration of Al by Spray pyrolysis technique. The X-ray diffraction (XRD) pattern reveals the anatase phase of the Al–TiO_2 thin films with tetragonal structure. A shift is observed in the XRD peak position compared to as prepared TiO_2 thin film indicates the incorporation of Al ions into Ti ions. The UV-Vis spectroscopy study shows that the absorption increases and the absorption peak shifts towards the visible region for Al–TiO_2 thin films compared with that of the as prepared TiO_2 thin film. The optical band gap values changes with the change in the Al concentration in TiO_2 thin films. The electrochemical analysis for optimized Al–TiO_2 thin film electrode was carried out by cyclic voltammetry (CV) method. CV studies of Al–TiO_2 thin film electrode show the good stability and linearity which is essential to fabricate biosensor. The sensor response to urea is linear with correlation coefficient of 0.944 and the sensitivity is 3.17 $\mu A\ mM^{-1}\ cm^{-2}$.

Keywords: Al–TiO2; Electrochemical Analysis; Sensing; Spray Pyrolysis; Thin Films; Urea