

Electrochemical studies of Mn(II) mediated by Li⁺ doped Indium Titanium Oxide (ITO) electrode.

Abstract

An electrochemical investigation of Manganese species has been carried out by using cyclic voltammetry (CV) at Lithium doped Indium Tin Oxide (ITO) electrode. The doping of the Li⁺ ion onto the Indium Tin Oxide (ITO) electrode was carried out to 10 potential cycling in the presence of 0.1M LiOH. The modified Li⁺/ITO electrode used as working electrode and was applied for the detection of Mn(II) in 0.1M KCl aqueous solution using cyclic voltammetry (CV). Electrode responses were obtained for the reduction of 50 μ M of Mn(II) at lithium doped modified ITO electrode, and bare ITO electrode. A well defined peak appeared at -136mV vs Ag/AgCl with a current enhancement and peak potential shift toward higher potential due to the presence of Lithium doped. Besides that, the presence of Lithium doped caused an increase of the reduction peak of Mn (II) ion (current enhancement) by about 2.9 times compared to use of bare ITO electrode. The optimum physical and chemical conditions such as pH, concentration of Mn(II) ion solution, and scan rate for current enhancement would be obtained. A linear relationship ($y= 1777.3x + 42.145$, $R^2=0.995$) was observed for the plot of current (μ A) versus concentration range of 10 μ M to 1.0mM of Manganese in 0.1M KCl using Lithium doped modified ITO electrode. Based on the background noise of 50 data points, adjacent to the reduction peak of Mn (II), and $3\sigma/\text{slope}$, a detection limit of 1.0nM was determined.

Keyword: Mn(II). Li⁺; Manganese; Lithium ion; Indium Tin Oxide (ITO).