ADSORPTION OF PHOSPHONIC ACID TERMINATED FERROCENE MOLECULES ON ITO ELECTRODES

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In order to develop devices where optical transmission is required [1,2], the modification of ITO electrodes through a series of suitably designed molecules terminated with the phosphonic acid moiety has been studied. The employment of the phosphonic acid group as the anchoring head tries to overcome some problems arising with the most popular SA for alkanethiols [3,4].

In the present work the adsorption of hexylferrocene phosphonic acid (**1**) (see chart 1) on ITO electrodes has been investigated by means of electrochemical analyses and compared with that of the homologue carboxylic acid (**2**).

The CV anodic peak of (**1**) adsorbed on bare ITO (Fig. 1) can be deconvoluted into two components which indicate the presence of two different redox systems on the surface, i. e. a quasi-ideal one with lower width at half height W and a higher peak potential value E° and a non-ideal one (higher W and lower E°); the latter characterized by lateral interactions among the alkyl chains.

To obtain an ideally non-interacting system of (**1**) on ITO surface, co-adsorption of (**1**) with N-alkylphosphonic acids of various lengths (**3**-**5**) has been performed. CV indicates that (**1**) molecules interact among each other on ITO surface so strongly that only long dodecyl chain is able to compete favorably with such aggregation.

The results indicate that compound **1** adsorbs in segregate domains on ITO surface, thus preventing the formation of ideally diluted monolayers.

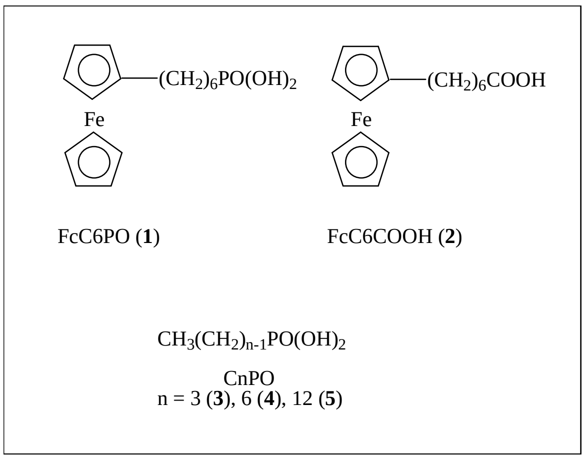

Chart 1

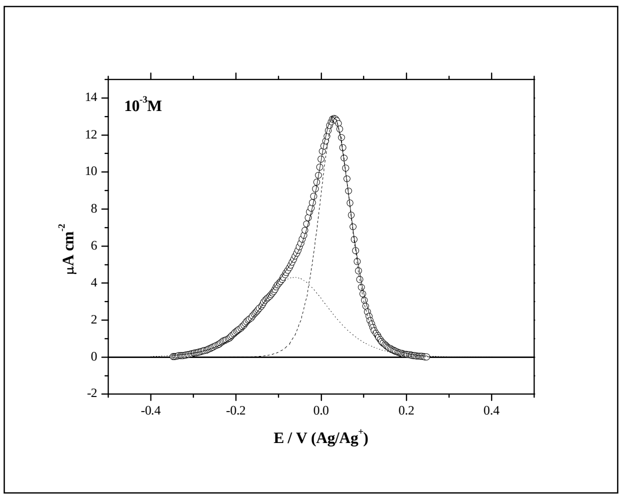

Fig. 1

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