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COPPER SURFACE MODIFICATIONS WITH 4-AMINOTHIOPHENOL AS A FIRST STEP IN THE ATTACHMENT OF SINGLE WALL CARBON NANOTUBES

Abstract

Modified electrodes have been attracting explosive interest in electrochemical studies because of the many unique properties that they are supposed to have after introducing modifiers, or, most importantly, because one can choose modifiers according to the requirements of their end applications. Lithium ion batteries are receiving considerable attention in applications, ranging from portable electronics to electric vehicles, due to their superior energy density over other rechargeable battery technologies. Consumers and NASA are in constant demand for thinner, lighter, space effective and shape, flexible batteries with a larger autonomy. The performance of a rechargeable battery depends on the active material employed for Li storage in the electrode. The introduction of nanomaterials as electrodes in the cells, in place of conventional electrodes, was intended to provide higher lithiation capability and an overall better performance simply because of the nanomaterials extremely high surface area as compared to their bulk counterparts. Out of the many nanomaterials available, carbon nanotubes (CNTs) attracted much attention, mainly because of their excellent conductivity properties. Synthesis of CNTs results from a wide variety of different methods that involved the catalytic decomposition of carbon-containing gas or solid. For lithium-ion battery CNT's have demonstrated a higher Li intercalation in its layer and central tubes, also the strain is less due to the strain on the planar bonds of the hexagon. Applications are most desirable to have the carbon nanotubes such as SWCNTs grown directly on a conductive surface such as copper. Copper has demonstrated to be a poor catalyst, for the growth of well ordered and abundant carbon nanotubes such as SWCNT's. We will be presenting the attachment of these single wall carbon nanotubes by using a self assembly monolayer technique (SAM). This 4-aminothiophenol SAM will be the first step on this electrode building block. The SWCNT's will be attached to the SAM following a condensation reaction. The reaction will be followed using RAIR and the electrode will be structurally characterized using SEM, TEM, XPS, FTIR and XRD also some electrochemical characterizations using a CR 2032 coin cells will be presented.