Palladium Electrodeposition on Carbon Multiwall Nanotubes

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We have shown the formation of layers of multi-walled carbon nano-tubes (MWNT) on Pt and Au surfaces with different thickness with a high reproducibility. These layers are shown to be stable in contact with aqueous electrolytes for further electrochemical studies provided that homogeneous suspensions of highly purified MWNT in C_2H_5OH are utilized. Notable enhancement of the double layer charging currents proportional to the MWNT amount was found for both Pt and Au electrodes in sulfuric acid solutions as well as in the two electron transfer steps of the anodic oxidation of the Wurster reagent.

Cyclic voltammetry and SEM investigations revealed that Pd deposition takes place on MWNT yielding 3D islands which are not completely dissolved during the anodic sweep. Pd was also found to distribute beneath the surface altering its reactivity towards to the further metal deposition. The reactivity of MWNT surface with respect to Pd electrochemical deposition was followed in dependence on its purity. The nature of the substrate does not play any significant role. The influence of MWNT on the electrochemical reactivity of the underlying metal support turned out to be different for Pt and Au. While Pd^{2+} discharge reaction takes place exclusively on MWNT surface when Pt is the substrate, on MWNT-Au it occurs concomitantly on MWNT and Au sites. Such experiments demonstrate that MWNT layers are promising electrode material for both basic and applied electrochemical research.

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