Supercapacitors based on aligned carbon nanotubes electrodes.

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Electrochemical capacitors are attractive for their high power and potentially applications. Carbon nano tubes is most perspective material for capacitor electrodes [1]. We study aligned multiwall carbon nanotube as electrochemical capacitor electrode.

Polished vitreous carbon (СУ-2500) plates with geometric surface areas ~3 cm^2 were used as substrate in our work.. Electrodeposition of palladium microparticles on vitreous carbon was performed in the 5 mM $PdCl_2$ +0.5M H_2SO_4 solution. The deposition was carried out in a potentiostatic mode at a stepwise potential change. At first, the electrode was kept at 0.75 V (20 s)< after that deposition was carried out at 0.15 V *vs* RHE. The amount of deposited palladium was determined by coulonometry assuming 100% current efficiency for palladium.

Carbon nanotube were deposited by plasma enhanced CVD method on vitreous carbon substrates. Hydrogen - methane gas mixture was exited by DC glow discharge. Nanotube film grown on anode. Deposited films was study by scanning electron microscopy, transmission electron microscopy, X-ray diffractometry and Raman spectroscopy. These measurements shown that our films are aligned multiwall carbon nanotubes. Fig.1 shows a SEM micrograph of a nanotube film.

The electrochemical measurements were carried out using a PI-50-1 potentiostat (see Fig.2). The polarization capacitance were estimated according to equation C_{pol}= i/v, where v is the potential scan rate. The specific polarisation capacitance were 50-70 Fg^{-1}. Our best samples have capacity up to 100 Fg^{-1}.

Fig. 1

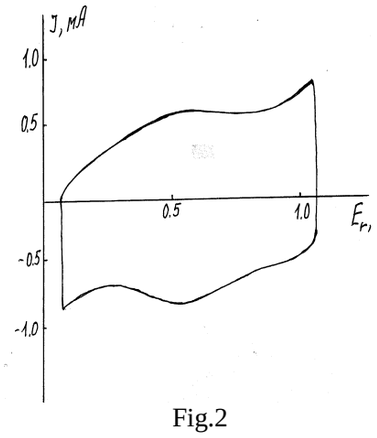

Fig.2

References:
1. C.Niu, E.K.Sichel, R. Hoch, D. Moy, H.Tennent, Appl. Phys. Lett., 1997 (70), 11, 1480