

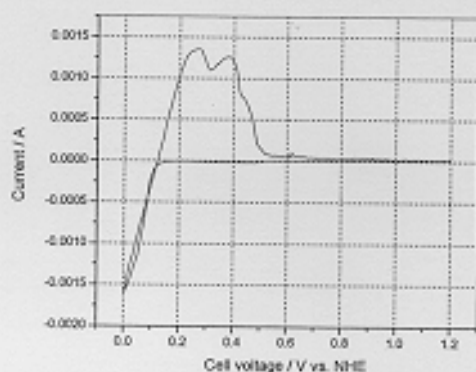
A Preliminary Electrochemical Characterization of Carbon Nanotubes in Acidic Media

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INTRODUCTION. Carbon nanotubes (CN) combine unique chemical and physical properties which have attracted the interest of the researchers and CN have been used in supercapacitors, chemical sensors and energy storage devices. A novel application of platinum supported single-walled CN (SWCN) as selective hydrogenation catalyst has been proposed [1]. Our interest is focused on both the evaluation of the hydrogen storage properties of CN as well as the preparation of CN supported metals to realize anodes for fuel cells.

EXPERIMENTAL. SWCN films were produced by using a new route [2] where amorphous hydrogenated carbon nanoparticles were used as precursor, without metal catalyst addition. The CN are formed by low-velocity spraying of carbon particles onto a heated Si(100) substrate, when the deposition temperature is sufficiently high to enable self-assembling processes. By applying this technique, we succeeded in producing SWNT with mean diameter of 1.2 nm, strictly interlaced in bundles of 50 nm diameter. Electrochemical characterization of SWCN was performed in a three-electrode cell using a platinum counter electrode and a saturated Ag/AgCl reference electrode. The cell was filled with a 1M H₂SO₄. High purity nitrogen was used to flush gases before and during the experiments. Milli-Q water was used throughout in all solutions and rinsing.

RESULTS. Figure 1 shows the cyclic voltammogram scanned to an upper potential of 0.0 V to promote the formation of hydrogen. The hydrogen adsorbed is subsequently oxidized in the reverse scan. Two peaks appear during oxidation indicating the existence of different adsorption sites. The quantity of hydrogen stored in this two sites is presumably the same, being the peak area of the same order of magnitude.



REFERENCES

1. V. Lordi, N. Yao and J. Wei, Chem. Mater. 13 (2001) 733,
2. S. Botti, R. Ciardi, M.L. Terranova, S. Piccirillo, V. Sessa, M. Rossi, M. Vittori-Antisari Appl. Phys. Lett., 80, 1441(2002)

Figure 1. Cyclic voltammogram for the SWCN on Si. Scan speed was 50 mV sec⁻¹.