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Hydrogen uptake in single-walled carbon nanotubes synthesized by the hydrogen arc plasma jet method. L.A. MORENO-RUIZ, J. ORTIZ-LOPEZ, Escuela Superior de Fisica y Matematicas, Mexico, A. DE ITA DE LA TORRE, J.S. ARELLANO-PERAZA, G. FLORES-DíAZ, UAM-Azcapotzalco, Mexico — Carbon nanotubes were synthesized by a modified electric arc discharge method under hydrogen atmosphere using a catalytic mixture of powders with composition C/Ni/Co/Fe/FeS. The samples were characterized with transmission and scanning electron microscopy, Raman spectroscopy and thermo-gravimetric analysis. Unpurified samples contain 20 wt% of carbon nanotubes, 2 wt% of other forms of carbon and 78 wt% of catalytic metals. Adsorption/desorption of hydrogen in unpurified samples at atmospheric pressure measured with gravimetric methods was of the order of 2 wt%. Samples for these measurements were prepared with a three-step treatment: (i) oxidation in air for 30 min at 500 °C, (ii) ball- milling for 1 hr, and (iii) second oxidation in air for 30 min at 500 °C. This treatment was applied to eliminate other forms of carbon as well as to shorten the tubes and open their caps. Hydrogen desorption was also measured in degassed samples (400 °C for 20 min in vacuum) which adsorbed H_2 while cooling to room temperature. Desorption in degassed/hydrogenated samples is a two-step process which we attribute to distinct desorption characteristics of nanotubes and of residual oxidized metal catalysts.

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