MWCNT activation and its influence on the catalytic performance of Pt/MWCNT catalysts for selective hydrogenation

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Carbon nanotubes (CNTs) present remarkable intrinsic properties [1], but, for many applications in which they have to interact with or to be integrated in a given system, it is necessary to functionalize their surfaces to obtain higher performances. In particular, even though no specific study has yet appeared on the subject, it has been shown that functionalization should be performed to produce well dispersed supported catalysts [2].

Multi-walled carbon nanotubes were submitted to three activation procedures: nitric acid oxidation, ball-milling and air oxidation. The influence of these treatments on nanotubes surface chemistry and morphology was evaluated by XPS, Raman and infrared spectroscopy, TGA, TPD, nitrogen adsorption and TEM. The three activated materials were used to prepare Pt supported catalysts from the organometallic precursor [$Pt(CH_3)_2(C_8H_{12})$]. The influence of the activation treatments, together with that of a post-reduction thermal treatment, on the performances of the catalytic systems in the selective hydrogenation of cinnamaldehyde was investigated. It was shown that the best compromise between catalyst activity and selectivity required a low amount of oxygenated groups on the support surface of the final catalyst together with an optimized platinum particle size.

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