Nanocomposites and nanomaterials

MWCNT/poly(dimethylsiloxane) nanocomposites: morphology and structure

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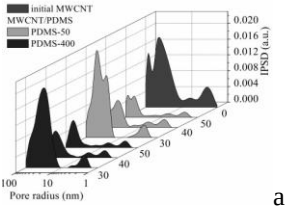
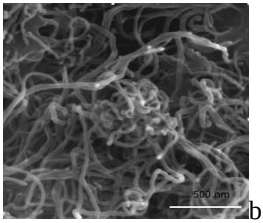
This work has been focused on research of the physicochemical characteristics of nanocomposites (NC) based on powder multiwall carbon nanotubes (MWCNT), synthesized using catalytic chemical vapor deposition (CCVD), and linear poly(dimethylsiloxanes) of two molecular weights (PDMS-400 and PDMS-50 with $W_m \approx 5700$, $d_p = 75$, and $W_m \approx 2970$, $d_p = 38$, respectively).



a



b

Fig. 1. Pore size distributions for initial MWCNT and MWCNT/PDMS NC (a) and SEM image of NC with 30 wt. % PDMS (b).

The low temperature nitrogen adsorption/desorption, FTIR spectroscopy and SEM studies have shown the influence of the length of the chain and PDMS concentration (C_{PDMS}) on structure of NC: main contribution into the textural porosity of MWCNT/PDMS NC is due to macropores (Fig. 1a) while initial MWCNT is characterized by bimodal porous structure. Initial MWCNT agglomerates in the form of tubes entangled with each other, with the length of 20–500 microns. In NC containing PDMS of 30 wt. %, the polymer macromolecules evenly distributed over a surface of CNT (Fig. 1b), while an increase in C_{PDMS} leads to the formation of associates of PDMS macromolecules and more pronounced aggregation of nanotubes in NC.

Acknowledgments: The authors are grateful to European Community, Seventh Framework Programme (FP7/2007–2013), Marie Curie International Research Staff Exchange Scheme (IRSES grant No 612484) for financial support of this work. The research was partly carried out with the equipment purchased thanks to the financial support of the European Regional Development Fund in the framework of the Polish Innovation Economy Operational Program (contract no. POIG.02.01.00-06-024/09 Center of Functional Nanomaterials).