

EPD AS A POTENTIAL FRACTIONING TOOL FOR CARBON NANOTUBES

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Abstract

Despite many interesting properties i.e. high mechanical strength [1] good thermal [2, 3] and electrical conductivity [4], the usage of carbon nanotubes in many fields of science or industry, including biomedical applications, is still limited by very low repeatability of the properties of the tubes within the stock sample. Furthermore, many producers offer products that may significantly differ in quality and actual properties, despite similar datasheets [5, 6]. This fact yields many contradicting reports, concerning both biocompatibility and basic materials' properties [7, 8]. In the literature, fractioning of the CNTs, altering in sizes or different level of chemical modification, is reported, pointing out potential applicability of electrophoresis [9]. We suggest a different approach, which enables simultaneous fractioning and layer fabrication, using Electrophoretic Deposition. In the proposed method it is possible to obtain layers with different surface properties, which are determinants of materials' cytotoxicity. The aim of this study was to test a potential applicability of the EPD method as a fractioning tool for carbon nanotubes. We report functionalization of the CNTs in the mixture of concentrated acids, preparation of a stable suspension in the acetone and ethanol solution and successful deposition of dense layers by means of the EPD, with varying times. The obtained materials are characterized via goniometer, XPS and EIS. It is proven that with increasing time of deposition, different CNTs individuals are deposited on the material, altering in type and amount of functional groups. Furthermore, with increasing thickness of the layer, character of electrical conductivity changes significantly. **ACKNOWLEDGEMENTS:**

Keywords: EPD, EIS, XPS, carbon nanotubes fractioning

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