Title: Strain sensors based on knocked down carbon nanotubes and bucky papers thin films

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Abstract

Recently, carbon nanotubes (CNTs) thin films have been widely applied in sensing applications due to their piezoresistive response. Furthermore, CNT anisotropic electric properties, due to its alignment, can provide useful information regarding strain direction. We present a comparative study between knocked down vertically aligned CNT based sensor, reported in our previous work [1], and CNT bucky papers (BP) based sensors. For this purpose, commercial multi-wall carbon nanotubes (MWCNTs) were dispersed in two different solvents, dimethylformamide (DMF) and ethanol, vacuum filtrated and dried. From these freestanding BP thin films, 10x10 mm squares were cut off and transferred to polyimide (PI) films. The relative electric resistance response and sensitivity of the strained samples was measured and compared with the knocked down CNT/PI based sensor. Moreover, the morphology of the samples was characterized by scanning electron microscopy (SEM). The results showed a high sensitivity to strain, however knocked down CNT/PI based sensor presented better mechanical performance and an anisotropic behaviour that can be used to infer strain direction.

[1]   A. Santos, L. Amorim, J. P. Nunes, L. A. Rocha, A. F. Silva, and J. C. Viana, "Aligned carbon nanotube based sensors for strain sensing applications," *Sensors Actuators, A Phys.*, vol. 289, pp. 157–164, 2019.

Biography

Ana Santos received the MSc degree in Biomedical Engineering at FCT/UNL, Portugal, in 2016. Her MSc dissertation was on biomaterials area: "Development of conductive membranes based on chitosan and reduced graphene oxide for biomedical applications". Presently, she is a researcher in IAMAT (Introduction of Advanced Materials Technologies into New Product Development for the Mobility Industries) project at UMinho, Portugal, and her work is focus on develop a CNT-based strain sensor.