Flexible Sensors Using Carbon, Carbon Nanotube and Carbon Nano Coil

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Abstract

The sensing technique using the carbon based materials and its electro-mechanical characteristics will be reported. Carbon coated yarn-based flexible sensors were fabricated by using piezo-resistive carbon fibers combined with the polymer fibers as a one dimensional strain sensors. Single and double wrapping methods were employed to fabricate the yarn-based sensors. The single walled carbon nanotubes for high sensitivity flexible strain sensors were fabricated at the room temperature. The grown well-aligned millimeter-long single-walled carbon nanotube (SWCNT) was mechanically transferred from the silicon substrate to the pre-trenched flexible polymer substrate. The sensor design allows effective adhesion between SWCNT and flexible substrate for lengthwise strain and piezo-resistivity change. Experimental results show that the sensor achieves a high strain resolution of 0.004%. The measured piezo-resistive gauge factor of the flexible sensor is 269. The carbon nano-coils (CNCs) are also synthesized and used for the sensors. The synthesis of the CNCs having coil diameter of 300-900 nm and its characteristics will be reported.

Bibliography

Dr. Shuo Hung Chang is a professor and the current department Chair in the Department of Mechanical Engineering, National Taiwan University. He also serves as the Deputy Director of the Center for Advanced Nano-Materials in the National Taiwan University. He received his B.S. degree from the National Cheng Kung University, Taiwan, M.S. and Ph.D. degrees from the University of Cincinnati, Ohio, USA. After completing his Ph.D., Dr. Chang had worked at the T. J. Watson Research Center, IBM Corp., Yorktown Heights, NY for 7 years where he worked on data printing, information storage and display technology. Then he decided to start his academic career at the National Taiwan University. During this period, he has served as the Director of the Nano-Electro-Mechanical-Systems (NEMS) Center and the Deputy Director of the Center for Nano-Science and Technology, National Taiwan University. He had also served for 3 years as

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