Milena Kurkowska, J Material Sci Eng 2016, 5:6(Suppl)
http://dx.doi.org/10.4172/2169-0022.C1.043

Effect of surface modification of multi wall carbon nanotubes on the electrical properties of the polymer composite epoxy/CNT

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The composites made from epoxy resin as a matrix with carbon nanotubes as filler are used in many industries, particularly, in the aerospace industry. The selection of the epoxy as matrix is associated with the commercial availability of a wide range of resins with varying viscosities and mechanical properties. The use of CNTs as filler improves electrical conductivity and mechanical properties. The single wall carbon nanotubes have the best electrical properties. Unfortunately, due to their high prices and low availability we decided to use the Multi Wall Carbon Nanotubes (MWCNT) as fillers. The interaction between the tubes in MWCNTs, surface defects and contamination after the production process (CCVD) leads to the reduction of electrical conductivity where as MWCNTs were surface modified in order to improve their electrical conductivity. Nanotubes were decorated with a coating of Ni-P by the application of electroless deposition. Homogenization of the solution was ensured by the use of an ultrasonic cleaner and disintegrator. Calendaring machine (three-roll mill) was used to homogenize the mixture of the epoxy resin and the filler. Finally, in order to examine the electrical conductivity, a Keithley 6221/2182 nanovoltometer was used. A method of surface preparation is important for the quality of deposited coating. Initial purification of carbon nanotubes, suitable homogenization, uniform sensitization and activation are important steps during the preparation of the substrate. Homogenization of the epoxy resin with carbon nanotubes using a calendaring machine provides a good dispersion of the nanofiller in the matrix. The addition of carbon nanotubes significantly improves electrical conductivity. Reducing the length of the CNTs, results in deterioration of electric conductivity in relation to the raw CNTs.

Biography

Milena Kurkowska has completed her Master's in Chemistry from the Warsaw University of Technology, Poland. She has done her Doctoral studies in Materials Science and Engineering. Her Master's thesis was on "Electroless deposition of composite layers of Ni-P and Ni-P-oxide (silicon, aluminum and titanium oxide) on substrates such as PET and carbon fibers". During her studies, she worked at Reckitt Benckiser in the Quality department.

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