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ТЕРМО ТА ТЕРМО-МЕХАНІЧНІ ВЛАСТИВОСТІ ПРОВІДНИХ ПОЛІМЕРІВ І КОМПОЗИТНИХ МАТЕРІАЛІВ, ЯКІ БАЗУЮТЬСЯ НА КАРБОНОВИХ НАНОТРУБКАХ

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THERMAL AND THERMO-MECHANICAL PROPERTIES OF CONDUCTING POLYMERS AND CARBON NANOTUBES BASED COMPOSITE MATERIALS

During the last two decades investigation of the conductive materials their properties and synthesis of new conductive polymer composites are the most interesting and researched field in nanotechnology. In present conductive polymer composites (CPCs) change an old materials in different areas due to their flexibility, low density, perfect corrosion resistance, excellent mechanical properties and possibility to change all this parameters by adding different fillers. Most efforts of modern research aimed at improving mechanical, electrical, thermal and other properties of the material.

Each property of the polymer composite can be change or corrected by adding different conducting particles. However, no one can say for sure how particular component or it value will influence on material properties. That is why new materials always need to test. In the case of polymer composites, we can choose number of parameters for testing starting from mechanical, thermal, electrical properties etc.

Number of authors investigate the influence of carbon nanotubes on the composite properties comparing with different matrix. Carbon nanotubes listed as stiffest and strongest material that man ever create. Due to good electrical conductivity properties, CNTs are widely used like a filler in different composite materials with big range of applications.

Today, there are hundreds of scientific papers on research the mechanical properties of CNTs composites and the influence of this filler on the composite properties. Many parameters such as CNT type, production method, type of synthesis etc., have significant influence on composite properties.

Polyurethane is one of the most important polymer in many branches of industry. Main advantages of this component are high impact strength at low temperatures, excellent corrosion resistance and good wear properties, its easy foamable, good resistance to oxidation, humidity, and tear propagation.

Polyaniline (PANI) have two main varieties such as poly (o-methoxyaniline) (POMA) and poly (o-ethoxyaniline) (POEA) that are widely used due to their optical, electrical properties, relatively simple method of synthesis.

The objects of our work are PU/PANI/CB/CNT composites with different amount of carbon nanotubes. The subject of research is to determinate the influence of carbon nanotubes on the material properties.

Main task of this work is to determinate thermal and mechanical properties of CNT based composite. In order to do this we need to conduct DMA testing of the samples. For all experiments, we will use DMA8000 (Perking Elmer).

Temperature scan mode is necessary in order to measure the glass transition temperature and viscoelastic behavior and stiffness of the material. Tensile/stress test can give for us the data, which is necessary for calculation of Young's modulus.

In addition it is necessary to determinate the influence and CNT amount on the material properties and make a comparison of results.