ABSTRACT BOOK

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Delaminated model for piezoélectric beams

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Laminated beams and plates are often used as primary load-carrying structures. One of the common types of damage modes in laminated composites is delamination. The presence of delamination is one of the most prevalent life-limiting failure modes in laminated composite structures.
A mathematical model for beams with partially delaminated layers is resented to investigate their behavior. In this formulation account is taken of lateral strains. The principal advantage of the element is that it allows the modeling of delamination anywhere in the structure. The region without delamination is modeled to carry constant peel and shear stresses; while the region with delamination is modeled by assuming that there is no peel and shear stress transfer between the top and bottom layers. Numerical results of the present model are presented and its performance is evaluated for static problems.

Keywords:
Beam, delamination, lateral strains.

DSL437
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Deposition of CuO nanoparticles on various Supports at Supercritical water medium

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In the current study, the deposition of nanoparticles of copper oxide on a high porosity templates are investigated using supercritical water. The objectives are to synthesize and disperse the metal oxide catalyst nanoparticles uniformly on the surface and in the pores of supports using supercritical water. The final aim is to gain general principles for the drawing of nanocomposite catalysts based on catalyst supports, and to derive factors that affect the catalyst during preparation. The supports would have the potential to join the best attributes of both homogeneous (highly active and selective) and heterogeneous (easy separation from the reaction media) catalysts. The use of supercritical water to deposit metal oxide nanoparticles on hydrophobic surfaces also offers promise for other-supported catalyst preparation not including the use of toxic or noxious solvents.

DSL454
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Effect of Nanotube Aspect Ratio on Chemicals Vapour Sensing Properties of Polymer/MWCNT Composites

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Recently we have reported that polyisoprene/high structured carbon black composites demonstrated excellent chemoresistivity effect [1]. In this study polyisoprene/multiwall carbon nanotube composites (PCNTC) have been elaborated and their electric resistance response to vapour of volatile organic compounds (VOC) was tested. PCNTC has been produced using 2 types of multiwall carbon nanotubes (MWCNT) with clearly different aspect ratio (h) - long MWCNT with h = 12500 and short MWCNT with h = 40 (purchased from « Cheap Tubes Inc »). Additionally to that measurements of electric resistivity temperature dependence showed semiconductor like properties for long MWCNT and metal like properties for short MWCNT. Producing PCNTC with gradually increasing MWCNT concentration, percolation curves of electric conductivity have been obtained and percolation thresholds determined (pc). Percolation threshold is pc = 3.15 and 5.8 for PCNTC with long and short MWCNT respectively.
PCNTC response to chemicals stimuli was analyzed by complex measuring technique, which enables simultaneous measurements of electrical resistance, mass and dimensions change of the sample exposed to certain VOC vapour. From obtained results an increase mechanism of composite electrical resistance as well as VOC vapour diffusion behaviour and parameters were evaluated. The MWCNT aspect ratio contribution to the composite VOC vapour sensing was evaluated as well.

[1] G.Sakale, M.Knite, V.Teteris, Sensors and Actuators. A: Physical, 171, 19 (2011)

DSL373

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Effects of sonication parameters on the mechanical properties of multi-walled carbon nanotube/epoxy nanocomposites

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Superior mechanical and physical properties of carbon nanotubes (CNTs) have made them very suitable reinforcement to fabricate multi-functional polymer nanocomposites. Addition of multi-walled carbon nanotube (MWNT) to a particular thermoset polymer such as epoxy can be achieved by in-situ polymerization method via sonication technique. This technique is one of the most utilized methods to disperse CNTs in the polymer matrix. However, few investigations have been reported about the effects of sonication parameters. In this research, the effects of sonication output power and time as the fabrication variables on the mechanical properties of MWNT/epoxy nanocomposites at constant filler content were investigated. Moreover, viscoelastic properties of fabricated nanocomposites were studied. To achieve these goals, the sonication power at three levels of 25, 50 and 75 W were performed at three durations of short, medium and long time to study dispersion states of MWNT as well as mechanical and viscoelastic properties of MWNT/epoxy nanocomposites. Scanning electron microscope (SEM) was utilized to study the fracture surface of specimens and dispersion state of MWNT in the matrix. Also glass transition temperatures (Tg) of specimen were obtained by differential scanning calorimetry (DSC). The results indicate that although increasing sonication time enhances dispersion, it has negative influence on some mechanical properties. By studying the results, optimum sonication output power and time are obtained to achieve desirable mechanical and viscoelastic properties.