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TITLE

Physical, mechanical, bound rubber and dynamic mechanical studies of chlorobutyl nanocomposites: Effect of multiwalled carbon nanotube loading and storage time

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Chlorobutyl elastomer nanocomposites were prepared using multiwalled carbon nanotube (MWCNT) as reinforcing filler. The morphology of samples has been studied from Scanning Electron Microscope (SEM). From the SEM photomicrographs smooth distribution of MWCNT was observed. The effect of MWCNT loading on mechanical properties show, increase in tensile strength, hardness and modulus and decrease in elongation at break, can be attributed towards better chlorobutyl elastomer-MWCNT interaction. The above explanation was verified from increase in bound rubber (BdR) contents with MWCNT loading. The variation of the BdR content with storage time was studied in solvents like chloroform, benzene & tri-chloroethylene. The BdR content increases with storage time in all compounds. The increase in BdR is higher during the initial 15 days followed by a marginal increase. Dynamic mechanical or Visco-elastic properties of nanocomposites have been studied as a function of temperature (-100 to 100 °C) at a constant frequency 1Hz and strain 1%. The effect of MWCNT loading on storage modulus, loss modulus and loss tangent has been studied. The non-linearity in tan delta and storage modulus and loss modulus was explained on the basis of MWCNT-elastomer interaction. The smooth cole-cole plots explain the non-linearity in the elastomer nanocomposites as well as excellent distribution of MWCNT in the elastomer matrix. The effect of MWCNT loading on cole-cole plots is explained on the basis of relaxation phenomenon.

Biography

Dr. Shyama Prasad Mahapatra has completed his Ph.D at the age of 32 years from Indian Institute of Technology Kharagpur in 2007 and postdoctoral studies from Chung-Ang University, Seoul, South Korea. He is Assistant Professor, National Institute of Technology Raipur, India, a premier Institute of National Importance. He has published more than 14 papers in international journals and 07 papers in international conference proceedings.