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Microstructures, thermal and electrical properties of poly(phenylene sulfide)/carbon nanotube nanocomposite films

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Poly(phenylene sulfide) (PPS) is well known for its heat resistance, high mechanical strength, excellent chemical resistance, and good electronic properties. It is used in many areas, especially in electronics, mechanical, and chemical engineering. In order to improve thermal and electrical properties of PPS as well as to expand its application, a series of PPS-based nanocomposite films containing multiwalled carbon nanotube (MWCNT) of 0.1~10.0 wt% as functional reinforcing nanofiller were manufactured by melt-mixing and -compression. The microstructures, thermal and electrical properties of the nanocomposite films were investigated as a function of the MWCNT content. FT-IR spectra and SEM images confirmed that PPS/MWCNT nanocomposite films supported that MWCNTs were randomly dispersed in the PPS matrix. DSC and TGA data indicated that the thermal transition temperatures as well as the degradation temperatures of the nanocomposite films were influenced by the presence of the MWCNT. The electrical resistivity of the nanocomposite films were dramatically changed with increasing the MWCNT by exhibiting a typical percolation threshold. Furthermore, the applications of PPS/MWCNT nanocomposite films as electric heating elements were demonstrated. The electric heating performance of the nanocomposite films with high MWCNT contents was systematically characterized in terms of temperature response rapidity, saturated maximum temperature, and electric power efficiency and operational stability at applied voltages up to 100V.

Biography

Young Ju Kim is a Master degree student in the group of Prof. Young Gyu Jeong at Chungnam National University, Republic of Korea. She received Bachelor degree in 2013 from the same institute. The topic of her master degree is the development of high performance nanocomposites containing functionalized carbon nanomaterials, and covers the entire process of synthesis and characterization of polymers, functionalization of carbon nanomaterials, and structure-property analysis of nanocomposites.

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