or 7 wt%) to distribute evenly in the blending system.

- 2) There is no significant change in the molecular structure and chemical composition of PSA by blending CNT.
- Crystallization in the PSA was promoted at low CNT contents because CNT can act as a nucleation agent.
- Mechanical properties such as the breaking tenacity and initial modulus of PSA composites can be obviously improved by the blending of CNT; however, the elongation at break of PSA/CNT composite fibers decreases.
- 5) The blending of CNT can improve the electrical conductivity of PSA composites and the percolation threshold of the system at about 3 wt%.

Acknowledgment

This paper was supported by the Excellent Young Teachers Program of Shanghai Municipal Education Commission (gjd10013), Shanghai University of Engineering Science Doctoral Fund (A-0501-10-006) and Technological Innovation Fund of Shangtex Holding (Group) Corporation (2011-zx-03-2).

References

- Wang Xiaofeng, Wang Fenghua, Ren Jiarong, et al. The performance and application of PSA fibers. In: Yu Mingfang, The symposium of development and application of high- temperature PSA fibers in 2009 [C]. Shanghai, 2009: 3-7.
- Wang Jiaming. Development Survey and Market Prospect of Polysulphonamide Fiber. *Fine Chemical Industrial Raw Materials & Intermediates* 2009; 6-7: 18-24.
- Ren Jiarong, Wang Xiaofeng, Zhang Yuhua. Development for market and application of polyphenylene sulphonamide fiber. *Technical Textiles* 2007; 25(5): 1-6.
- Yu Minfeng, Bradley S. Files, Sivaram Arepalli, et al. Tensile loading of ropes of single wall carbon nanotubes and their mechanical properties. *Physical Review Letters* 2000; 84(24): 5552-5555.
- 5. Ph. Avouris, J. Appenzeller, R. Martel, et al. Carbon nanotube electronics. In: *IEEE*, 2003; 91(11): 1772-1784.
- Zhang Lide, Mou Jimei. The structures of nano materials. Beijing: Science Press, 2001: 420-476.
- Yang Waitai. The characterization and testing of polymer. Beijing: China Light Industry Press, 2008: 72-80.
- 8. Meng Qinghao, Hu Jinlian, Zhu Yong. Shape-Memory Polyurethane/Multi-

walled Carbon Nanotube Fibers. *Journal* of *Applied Polymer Science* 2007; 106: 837-848.

- 9. Liu Jiexia, Tang Zhiyong, Zhang Deren, et al. Preparation and performance of polysulfonamide nanocomposites and it's fiber [J]. *Technical Textiles* 2007; 2: 14-20.
- Broadbelt LJ, Dziennik S, aKlein MT. Thermal stability and degradation of aromatic polyamides. Part 2 Structurereactivity relationships in the pyrolysis and hydrolysis of benzamides. *Polym Degrad Stab* 1994; 45 (1): 57-70.
- Broadbelt LJ, Dziennik S, Klein MT. Thermal stability and degradation of aromatic polyamides. Part 1 Pyrolysis and hydrolysis pathways, kinetics and mechanisms of N-phenyl benzamide. *Polym Degrad Stab* 1994; 44 (2): 137-144.
- Zhang XY, Cheng Y, Zhao. JB. Polymer chemistry. Beijing: China Light Industry Press, 2000: 285.
- Yang Wantai. Characterization and testing of polymer materials. Beijing: China Light Industry Press, 2008: 144.
- Jiang Fengdan. Study on the preparation and structure and performance of the Cool polyurethane / CNT nano composites. Beijing: Beijing University of Chemical Technology, 2009.

Received 01.11.2011 Reviewed 16.06.2012

Lodz University of Technology Faculty of Material Technologies and Textile Design

Department of Man-Made Fibres

Research:

The Department of Man-Made Fibres has more than 50 years of history and experience in man-made fibres. The main scientific interest of the Department can be divided into several fields: - composite interactive cellulose fibres based on NMMO, - nanofibres from biodegradable polymers, - advanced materials based on biodegradable polymers for medical and technical applications, - special fibres based on advanced polymers.

The Department is equipped with advanced devices for spinning solution preparation and fabrication of fibres and nanofibres by different methods (melt state, dry-wet, wet spinning).

Cooperation:

The Department is currently looking for partners from academia or industry.

We offer:

The Department is equipped with various devices for the determination of the properties of fibres and polymers: - thermal analysis (TGA and DSC), - rheometers and devices to determine the melt flow rate, - devices for determining the mechanical properties of fibres (e.g. tensile tester), - spectrometers (FTIR, UV-vis), - optical microscopes.

For more information please contact:

Department of Man-Made Fibres Lodz University of Technology ul. Zeromskiego 116, 90-924 Łódź, Poland tel.: (48) 42-631-33-59 e-mail: Piotr.Kulpinski@p.lodz.pl website: http://www.k41.p.lodz.pl/