European Polymer Congress (EPF 2013)

Book of Abstracts

Pisa (Italy), 16 – 21 June, 2013

Thermo-mechanical behavior of electrospun thermoplastic polyurethane nanofibers

D. Alhazov,[a] A. Gradys,[a, b] P. Denis[b], P. Sajkiewicz[b], A. Arinstein,[a] and E. Zussman[a,]*

[a]Faculty of Mechanical Engineering, Technion-Israel Institute of Technology, Haifa 32000, Israel
[b]Institute of Fundamental Technological Research of Polish Academy of Sciences, Pawinskiego 5B; 02-106 Warsaw, Poland
**Email of corresponding author: meeyal@technion.ac.il*

Study of thermo-mechanical behavior of electrospun thermoplastic polyurethane (PUR) block co-polymer nanofibers is presented. Upon heating, nanofibers began to massively contract, at ~ 70°C, whereas films started to expand (**Fig. 1**). Analysis of radial wide-angle *x*-ray scattering (WAXS) profiles of the nanofibers showed no diffraction peaks related to crystals, whereas their amorphous halo had an asymmetric shape, which can be approximated by two peaks differing in width. Changes in the contribution of the peaks during heating, accompanied with an endothermic DSC peak coinciding with the start of the nanofibers contraction, can be attributed to relaxation of an oriented stretched amorphous phase created during electrospinning [1]. Such structure relaxation becomes possible, when hard segment clusters are destroyed upon heating.

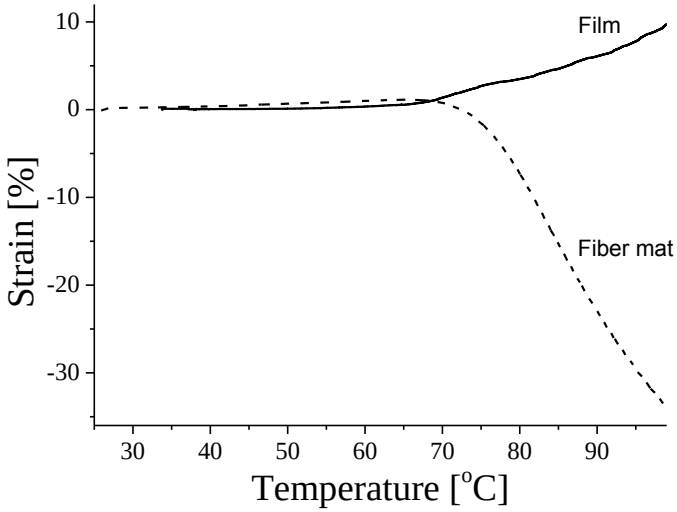

Figure 1. Strain vs. temperature response of electrospun PUR fibers and film (heating rate 1 C°/min) conducted in a DMA at force control.

[1] A. Arinstein, E. Zussman, *J. Polymer Sci., part B: Polymer Physics* **2011**, *49*, 691.