P-3-1099

MECHANICAL PROPERTIES AND ABRASION WEAR BEHAVIOR OF TIO2/POLYURETHANE NANOCOMPOSITES PREPARED BY SOLUTION BLENDING

Mona Mahboob Kanafi, Reza Chegeni, Fathollah Moztarzadeh, Mehdi Barikani,

Biomedical Engineering, Amirkabir University of Technology

mona_mahboob@aut.ac.ir

Polyurethane nanocomposites containing various contents of modified and un-modified TiO2 nanoparticles were prepared via solution mixing method. For the improvement of nano-particles dispersion and increasing possible interactions between nano-particles and polymeric matrix, the surface of the nano-particles was modified with amino propyl trimethoxy silane (APS). The qualitative grafting of amine group on TiO2 surface was investigated by Fourier transform-infrared spectroscopy (FTIR) which confirmed the formation of double bonds of silane coupling agent on the surface of TiO2 nanopowders. Mechanical properties and abrasion behavior of the resulting nanocomposites were evaluated with tensile strength measurement and Taber abrasion test, respectively. Results revealed that surface treatment of TiO2 nano-particles with APS better improves tensile properties and abrasion wear resistance of the filled matrixes in comparison to un-modified particles incorporated into the polyurethane. Such incremented properties were attributed to the nanoscale dispersion of TiO2 into polyurethane matrix. The extent of this effect depends on the weight fraction of introduced nano-TiO2, so that increasing nanoparticles loading led to enhancement in tensile and wear resistance properties. Fractural surface of the tensile samples were observed by scanning electron microscopy (SEM), which reflected some information about the cause and location of the failure. SEM micrographs of worn surfaces were also studied in order to investigate the dominant wear mechanism in the resulting nanocomposite sheets.