Nanocomposites and nanomaterials

Nano-mechanical behavior of UHMWPE nanocomposites for medical applications

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The UHMWPE-based hybrid nano composites reinforced by short carbon fibers (SCFs) and nano-SiO_2 particles or hydroxyapatite nanoparticles were fabricated and nano-mechanical properties were determined by using nanoindentation and nanoscratching methods.

The hardness and elastic modulus of the polymer matrix and interphase of the composites were investigated. The frictional responses of different regions and the estimated length of the interphase were evaluated by nanoscratching. The results showed noticeable differences between the frictional response, hardness and elastic modulus of the regions. Furthermore, the nanomechanical properties of the composites showed considerable improvement in the presence of the reinforcements.

1. *S. A. Mirsalehi, A. Khavandi, Sh. Mirdamadi, M. R. Naimi-Jamal, S. M. Kalantari.* Nanomechanical and tribological behavior of hydroxyapatite reinforced ultrahigh molecular weight polyethylene nanocomposites for biomedical applications // J. Appl. Polym. Sci. -2015.-DOI: *10.1002/APP.42052*

2. *M. Sattari, M. R. Naimi-Jamal, A. Khavandi.* Interphase evaluation and nano-mechanical responses of UHMWPE/SCF/nano-SiO2 hybrid composites // Polym. Test.-2014.-**38**.-P. 26-34.