

Argon/Oxygen Plasma Surface Modification of Biopolymers for Improvement of Wettability and Wear Resistance

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Abstract : Artificial joint replacements such as total knee and total hip prosthesis have been applied to the patients who affected by osteoarthritis. Although different material combinations are used for these joints, biopolymers are most commonly preferred materials especially for acetabular cup and tibial component of hip and knee joints respectively. The main limitation that shortens the service life of these prostheses is wear. Wear is complicated phenomena and it must be considered with friction and lubrication. In this study, micro wave (MW) induced argon+oxygen plasma surface modification were applied on ultra-high molecular weight polyethylene (UHMWPE) and vitamin E blended UHMWPE (VE-UHMWPE) biopolymer surfaces to improve surface wettability and wear resistance of the surfaces. Contact angel measurement method was used for determination of wettability. Ball-on-disc wear test was applied under 25% bovine serum lubrication conditions. The results show that surface wettability and wear resistance of both material samples were increased by plasma surface modification.

Keywords : artificial joints, plasma surface modification, UHMWPE, vitamin E, wear

Conference Title : ICMSTE 2016 : International Conference on Medical Science, Technology and Engineering

Conference Location : Paris, France

Conference Dates : July 25-26, 2016