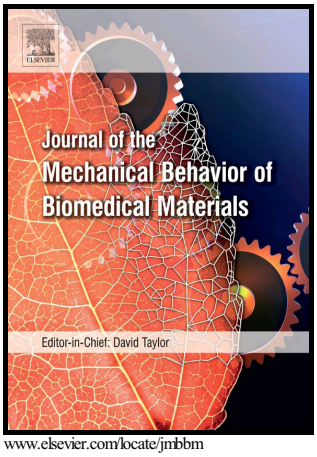

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Abstract

Plasma nitriding of the Ti-6Al-4V alloy (TA) sample was carried out in a plasma reactor with a hot wall vacuum chamber. For ease of comparison these plasma nitrided samples were termed as TAPN. The TA and TAPN samples were characterized by XRD, Optical microscopy, FESEM, TEM, EDX, AFM, nanoindentation, micro scratch, nanotribology, sliding wear resistance evaluation and in vitro cytotoxicity evaluation techniques. The experimental results confirmed that the nanohardness, Young's modulus, micro scratch wear resistance, nanowear resistance, sliding wear resistance of the TAPN samples were much better than those of the TA samples. Further, when the data are normalized with respect to those of the TA alloy, the TAPN sample showed cell viability about 11% higher than that of the TA alloy used in the present work. This happened due to the formation of a surface hardened embedded nitrided metallic alloy layer zone (ENMALZ) having a finer microstructure characterized by presence of hard ceramic Ti_2N, TiN etc. phases in the TAPN samples, which could find enhanced application as a bioimplant material.