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Tribocorrosion Dependence on Porosity of TiNi Alloysin Phosphate?Buffered Saline Solution

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Abstract: Degradations of implants during their service life lead to rejection because of corrosion and wear-related problems, i.e., toxicions and wear particles released into the human body. In this case, tribocorrosion tests are appropriate ways to investigate thesynergistic effect of the corrosion and wear phenomena, on the material implant in simulated body fluids. This study aims toanalyze the bio-tribology as well as the tribocorrosion performances of porous TiNi alloys, fabricated from elemental powdermixture (Ti, Ni) by powder metallurgy. The effect of the level in porosity, resulting from four (04) different cold pressing, wasinvestigated against alumina ball in phosphate-buffered saline solution (PBS) at 37 °C. SEM/EDS microstructural analysesrevealed the presence of various phases with TiNi as the predominant phase. Obtained results showed that the lowest frictioncoefficient was recorded for the sample with 33% in porosity rate when sliding against an alumina ball in dry conditions. Ahigh tribocorrosion resistance for all the studied TiNi compositions was also observed. Based on the corrosion parametersand the wear rate, the composition with the highest porosity exhibited the optimum performance.

Keywords : TiNi alloys, Biotribolgy, Tribocorrosion, Porosity