

A
Dissertation report
On
**"Corrosion and Wear behavior of medical grade
AISI 316L stainless steel in Simulated Body Fluids"**

Submitted in partial fulfilment of the requirement
Of the degree of

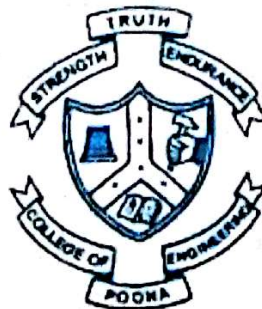
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ABSTRACT

Metals are widely used in number of applications in medical field for internal support as transplant and biological tissue replacements. Stainless Steel, Co-Cr alloys and Ti alloys are mostly used biomaterials in biomedical applications. Development of biomaterials with high corrosion and wear resistance is critical for ensuring a longer life for the biomaterial. The aim of this work is to evaluate the corrosion and wear behavior of medical grade 316 L austenitic stainless steel as a biomaterial in simulated body fluids such as 3.5 wt% NaCl, Hank's Balanced Salt Solution (HBSS), saline water and natural sea water as lubricants and as electrolytes. AISI 316 L has better chemical bio compatibility and mechanical properties which are comparable with that of human bone. The wear rate was found to be more in saline water and less in sea water than other lubricants. The corrosion rate was found to be more in sea water and less in saline water than all other electrolytes. The Scanning Electron Microscopy (SEM) investigation was utilized to analyze the microstructure and surface morphology. The obtained results are compared, correlated and presented in the report. Various wear phenomenons have been observed such as abrasive, adhesive, fatigue wear on the surface of SS 316 L after the wear tests. Results showed the phenomenon of pitting corrosion on the metal surface. The alloy gets passivated in all electrolytes which can be attributed to oxidizing nature of the concentrated acids. Very few researchers have studied the corrosion and wear behavior of SS 316 L in saline water even though it is one of the most severe lubricants for wear in case of 316 L stainless steel. As saline water is used for patients as body fluids, it is essential to understand its interaction with implants. Also, very less work has been reported on comparative study of corrosion and wear behavior of SS 316 L in various body fluids. The corrosion and wear rate of SS 316 L in saline water has been compared with other simulated body fluids.

Keywords: saline water, stainless steel, biomaterial, wear, lubricants, implant, body fluids, electrolytes, pitting corrosion, passivated, etc.