

Dental tribology evaluation of ferritic stainless steels for magnetic implants

Eurico Felix Pieretti^{1*}, Rogério Albuquerque Marques¹, Jorge Thiago de Sousa Lima Wilcken²,
Ronaldo Câmara Cozza², Maurício David Martins das Neves¹

¹ Instituto de Pesquisas Energéticas e Nucleares (IPEN/CNEN), Av. Prof. Lineu Prestes 2242,
São Paulo - SP, 05508-000, Brazil

² Centro Universitário da FEI, Av. Humberto de Alencar Castelo Branco 3972, São Bernardo do
Campo- SP, 09850-901, Brazil

*corresponding author: efpieretti@usp.br

Abstract

The tribological behaviour of the AISI 444 ferritic stainless steel (SS) was evaluated in a phosphate buffer solution (PBS). The ferromagnetic property of ferritic SS makes them potential materials for use as implantable dental devices with magnetic connections. The AISI 444 stainless steel tested is a Nb and Ti stabilized SS and it presented mainly Nb and Ti rich types precipitates in its microstructure.

This work has a specific focus on covering the possible *in vitro* wear modes seen on metal-on-metal surfaces. Ball-cratering wear test was carried out for 10 min with a solid sphere of AISI 420 SS as counterbody, at a frequency of 75 rpm.

The results address the potential detrimental effects of hard particles *in vivo* such as increased wear rates (debris generation), which is greatly influenced by the normal force, and corrosion (metal-ion release).

Key words: Biomaterials, Magnetic Implants, Ferritic Stainless Steels, Dental Tribology.