# INFLUENCE OF THE CHAMBER PRESSURE ON THE PROPORTION OF ANATASE AND RUTILE PHASES IN TITANIUM OXIDE THIN FILMS PRODUCED ON TITANIUM BY SPUTTERING

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## 1. Introduction

Titanium (Ti) and its alloys are materials widely used as biomaterials, namely osseointegrated implants, since it has low toxicity and biocompatibility in these applications. Also, Ti-based materials generally possess high corrosion resistance and have a relatively low modulus elasticity when compared to other metals used for implants, such as cobalt-chromium alloys and stainless steels [1]. The corrosion resistance is generally due to the presence of a passive film on its surface, consisting mainly of amorphous titanium dioxide. ($TiO_2$)

In recent years, thin films have been studied with the purpose, among others, to promote better surface behavior in respect of corrosion and tribocorrosion.

The objective of this study was to use the sputtering technique for depositing thin films of $TiO_2$ with different relative amounts of anatase and rutile on commercially pure titanium.

## 2. Experimental

The thin films were deposited on commercial titanium substrate by sputtering technique. The control of the proportion of different phases was carried out by the manipulation of the deposition parameters, specifically the system pressure. Structure of the films was evaluated by X-ray diffraction, together with Rietveld refinement.

## 3. Results and Discussions

Anatase formation is favored by high pressures, while rutile becomes predominant at low pressure. It was shown that by controlling the relative amount of anatase and rutile it is possible to minimize the possibility of the release of wear debris and/or metallic ions which may compromise the lifetime of osseointegrated implants.

## 4. References

[1]- MARINO, C. E. B.; MARCARO, L. H. **Electrochemical Tests to valuate the Stability of the Anodic Films on Dental Implants**. International Journal of Electrochemistry, V. 2011, p. 1-7, 2011.

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