

## STUDY OF THE METALLOGRAPHIC STRUCTURE OF TWO TITANIUM ALLOYS FOR BIOMEDICAL PROSTHESES

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### Abstract

The present study has the objective of defining the metallographic structure of two titanium alloys in order to find if they can be used in medical prostheses. The composition of the alloys is: Ti4Fe (93.2% Ti, 4% Fe, 2% Al, 0.8 V) and Ti10Al (89.5% Ti, 0.5% V, 10% Al).

For the purpose of obtaining the metallographic structure, it was necessary to use an optic ZESS microscope Axio Vert A1. The materials were initially cut into samples of small volume and covered in epoxy resin in such a way as to leave a controlled surface exposed to the environment [1]. Afterwards the samples were polished and grinded with a Struers polishing machine, SiC papers and an alpha-alumina suspension of 0.1  $\mu\text{m}$  [2]. When this process was finished, the samples were cleaned for preventing possible contaminations that could affect the results. The alloys were then submerged in Kroll reactive for five seconds in order to expose their metallographic structure by acid attack. Shorter immersion times were not sufficient to observe the structure satisfactorily, and longer times caused regions of the alloys to burn.

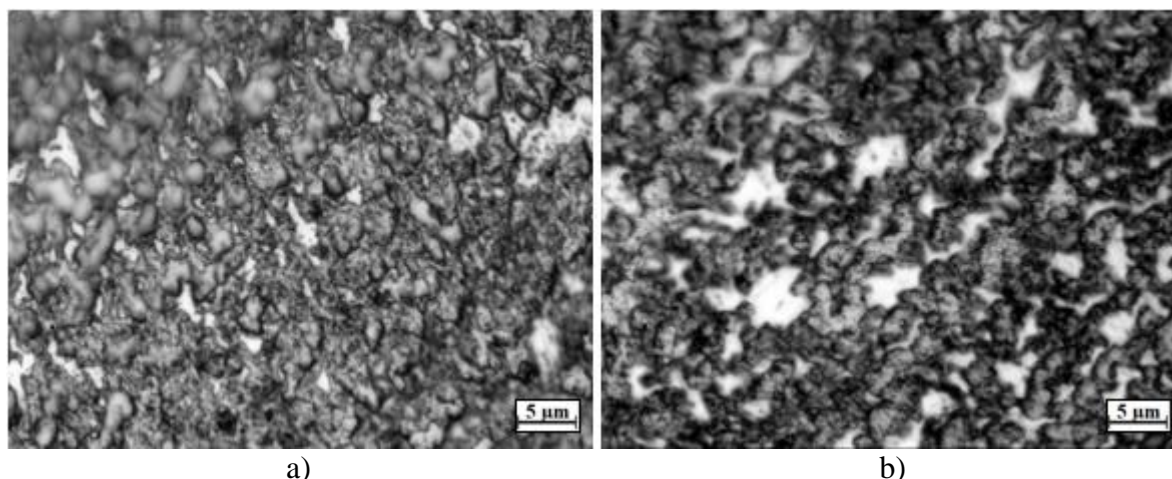


Figure 1. Metallographic structure of alloys Ti4Fe (a) and Ti10Al (b) observed with 100x magnifications.

The presence of the allotropic forms of  $\alpha$ -titanium and  $\beta$ -titanium can be seen in the two images obtained [3], although it is not possible to distinguish which of the regions corresponds to which. If one wanted to obtain this information, it would be necessary to use other tests [4,5]. It can be seen that in the Ti10Al alloy there is a greater presence of burnt regions by the acid attack of the Kroll reactive, although not enough so that the structure cannot be appreciated.

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