

# EFFECT OF TANTALUM CONTENT ON THE MICROSTRUCTURE, HARDNESS AND CORROSION RESISTANCE OF Ti-MO-ZR ALLOYS IN SIMULATED BODY FLUID

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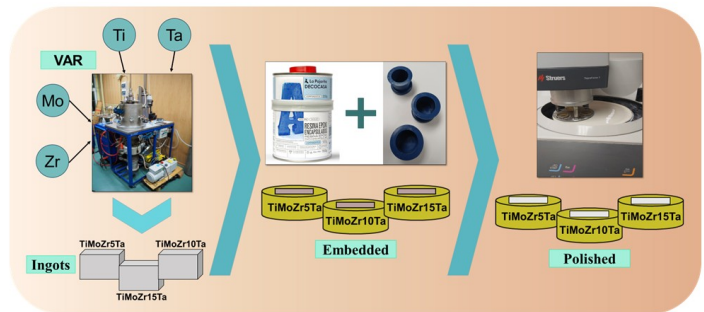
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## ABSTRACT

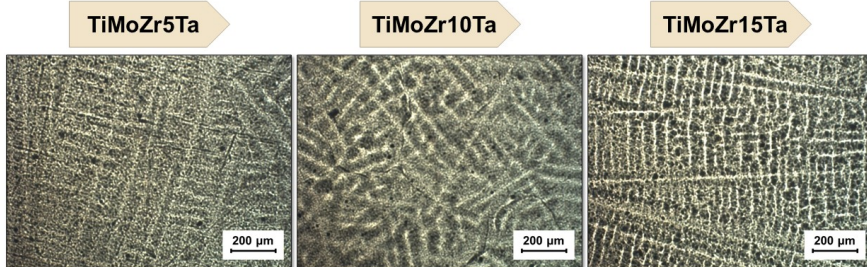
Titanium and titanium alloys have a solid reputation in the biomedical field due to their exceptional biocompatibility. However, it has been proven that certain types of alloys, such as Ti6Al4V and NiTi, can release toxic ions. The present study investigates three novel titanium alloys, designated TiMoZr<sub>x</sub>Ta (x = 5, 10 and 15 wt. %), which were manufactured by means of Vacuum Arc Remelting (VAR). The addition of advantageous elements such as molybdenum (Mo), zirconium (Zr) and tantalum (Ta) to these alloys has been shown to increase the durability, biocompatibility and strength of implants, thereby improving the quality of life for those who receive them. It has been demonstrated through advanced microstructure analysis, microhardness testing and electrochemical testing that an increased concentration of Ta enhances corrosion resistance by facilitating the development of a more robust passive layer. However, the Vickers hardness values obtained were similar for all three samples, with TiMoZr5Ta showing slightly higher values.

## MATERIALS PREPARATION

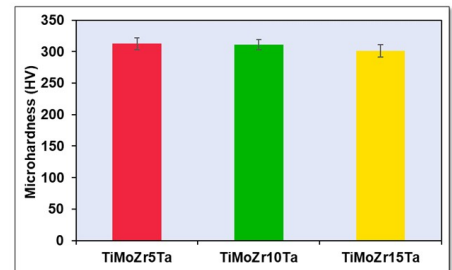
Element	TiMoZr5Ta	TiMoZr10Ta	TiMoZr15Ta
Ti (wt.%)	73.94±0.20	68.75±0.20	63.71±0.50
Mo (wt.%)	14.57±0.30	15.10±0.10	14.85±0.30
Zr (wt.%)	6.75±0.10	6.80±0.10	6.99±0.20
Ta (wt.%)	4.74±0.10	9.35±0.30	14.45±0.20



## METALLOGRAPHIC TEST

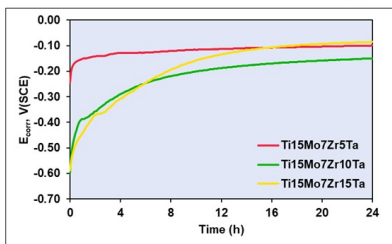


## MICROHARDNESS TEST

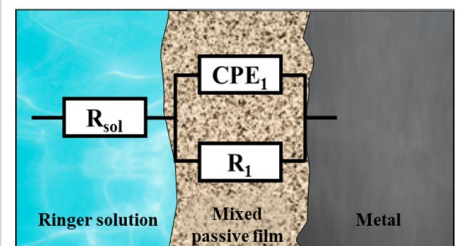
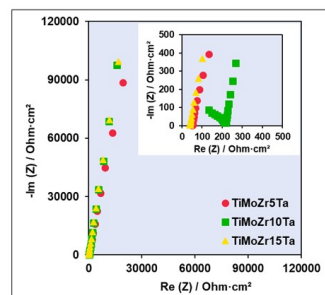


## ELECTROCHEMICAL TESTS

### CORROSION POTENTIAL



### ELECTROCHEMICAL IMPEDANCE SPECTROSCOPY



### CORROSION RATE

