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EFFECT OF OXYGEN IN THE ANELASTIC PROPERTIES OF BIOMEDICAL Ti-15Zr-BASED ALLOYS

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Ti-based alloys have been applied in orthopedical and dental implants due your better mechanical compatibility with the human bone. However, efforts have been made for adjust the Young's modulus (preventing stress shielding effect) and strength (avoiding failure). Oxygen is a well-known interstitial element which could influence strongly the mechanical properties of Ti and its alloys. This work aims to evaluate the oxygen effect in the Young's modulus and damping property of novel Ti-15Zr-based alloys. Ti-15Zr-(0, 5, 10, 15 and 20)Mo were produced by arc-melting with commercially pure metals. Then, the ingots were submitted to a hot-rolling (1273 K / air cooling) and heat treatment (1273 K / 86.4 ks / slow cooling). Interstitial oxygen was changed by gas charge in a quenching treatment (1123 K / 7.2 ks / water cooling). The samples were inserted in a quartz tube which was kept in a high vacuum (10-6 Torr), followed by oxygen doping (0, 0.1, 1 and 10 Torr) during the temperature plateau. Thermomechanical analysis was carried out in DMA equipment, from room temperature up to 723 K. The Young's modulus and internal friction of the alloys were evaluated as function of the oxygen content. The beta-type alloys (with Mo content above 10 w%) showed Snoek's peaks due the reordering induce by stress of interstitial oxygen around the metallic matrix and alloying elements. The crystalline structure and oxygen content acted in the changing of the Young's modulus in a non-linear way. The oxygen doping was effective for induce high-damping keeping low Young's modulus in the alloys which could be interesting for biomedical applications. (Financial support: CNPq and Fapesp)