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### **Anisotropic thermomechanical properties of a superelastic Nickel-Titane thin tube**

The superelasticity exhibited by Ni-rich Nickel-Titane shape memory alloys is a widely employed feature in many fields and, particularly, the use of superelastic NiTi tubes is consolidated in the fabrication of a wide range of biomedical stents. NiTi alloys are very often considered as isotropic when modeling the behavior of structures. However, structures like stents manufactured from highly texturized thin tubes will certainly present a marked anisotropic behavior.

Therefore, the consideration of isotropy in the design and modeling of devices manufactured from NiTi tubes can lead to serious misuse.

In this context the present work aims to quantify the anisotropic mechanical behavior of a thin-walled superelastic NiTi tube. The tube was opened through a one-step shape setting and dogbone samples were cut in five orientations ( $\theta$ ): 0° (drawing direction - DD), 22.5°, 45°, 67.5 and 90° (transverse direction - TD). Samples were subjected to isothermal tensile tests at 40°C, 50°C and 60°C. Strain field was measured in the gauge area by digital image correlation (DIC). Key properties like transformation strain, transformation stress, Clausius-Clapeyron coefficients and hysteresis, accounted as the irreversible energy per superelastic cycle, were then analyzed as function of orientation. Significant variations occurred between the samples oriented at DD and TD to the sample oriented at 45°, reaching around 40% for transformation strain and 70% for hysteresis. Also, although not globally symmetrical, the profiles of the studied properties showed that some directions behave similarly.