Study of transition temperature of phase in NiTi-based shape memory alloys

M. I. N. da Silva¹, J. O. Magela¹,², G.M. Ribeiro³, N. Speziali³, and M. S. Andrade¹

¹Fundação Centro Tecnológico de Minas Gerais – CETEC, Avenida José Cândido da Silveira, 2000, CEP 31170-000, Belo Horizonte, MG, Brazil, e-mail: jardel.magela@cetec.br
²Rede Temática em Engenharia de Materiais – REDEMAT - Ouro Preto, MG, Brazil.
³Universidade Federal de Minas Gerais - DF– Campus Pampulha, Belo Horizonte, MG, Brazil.

Shape memory alloys (SMA) have been intensively studied over the past 40 years and there are several applications mainly when talking about TiNi alloys. The biological, medicine, aerospace industry applies this material in different technologies. Electrical resistivity measurement has been used by several authors [1-3] to study the phase transformations related to the shape memory behaviour. In this technique it is possible to obtain the volume fractions of the austenite, martensite, and R phases in the samples. In the present work the reverse phase transformations on heating were studied using electrical resistivity measurement x-ray diffraction (XRD) techniques as well as other techniques to support them of NiTi alloys shape memory. The B2, B19’ and R phases were characterized by XDR in tensile tests deformed samples of 0, 2, 4, 6, and 8%. The electrical resistivity (figure 1) of all samples decreasing linearly with increasing temperatures, but in the range of temperatures where the phase transformation occurs the resistivity dropped quickly. The R-phase showed higher electrical resistivity than the austenite and the martensite phases, but its value increases with decreasing temperature. This can be associate with a continue increase of the rhombohedral distortion angle of the R phase. It was observed by XRD (figure 2) the increasing of B19’ phases and the decreasing of R-phase with increasing deformation.

Keywords: NiTi alloys, Shape memory alloy, XRD, electrical resistivity.

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e-mail margareth.spangler@cetec.br