Phase transformations in Ni-Ti SMA alloy spring

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Abstract. Equi-atomic Nickel-Titanium (Ni-Ti) alloy is one of the prominent materials to exhibit two way shape memory effect (TWSME). Since the material by itself can change shape due to variation in temperature, it is also used as an actuator. In the present study, Ni-Ti (49.5at%Ni-Ti) alloy wire is converted into a spring coil with straight portions on either ends by shape setting. Training is provided to the spring coil portion to achieve TWSME. Separate specimens from the spring and straight portions were extracted. Phase transformations were observed in the spring and straight portions during heating and cooling. Phase transformation behaviour of the spring coil and straight portions were studied using differential scanning calorimetry (DSC). The straight portion undergoes simple thermal cycles. But the spring coil portion undergoes thermomechanical (TM) cycles due to change in shapes during heating and cooling. The thermograms obtained show difference in their nature of phase transformations. Discussion focusses on the difference in the thermograms appearing for the specimens from straight and coil portions.

References:

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