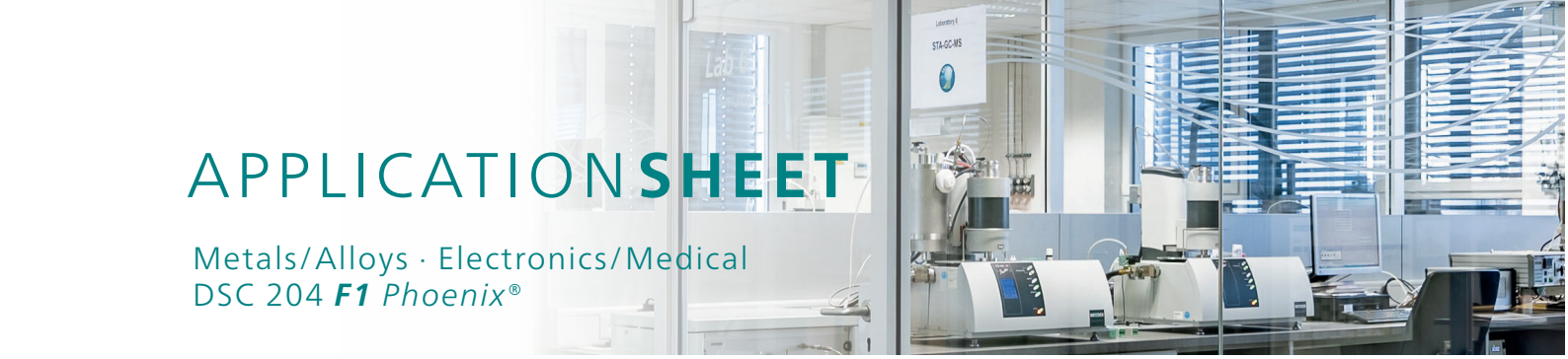


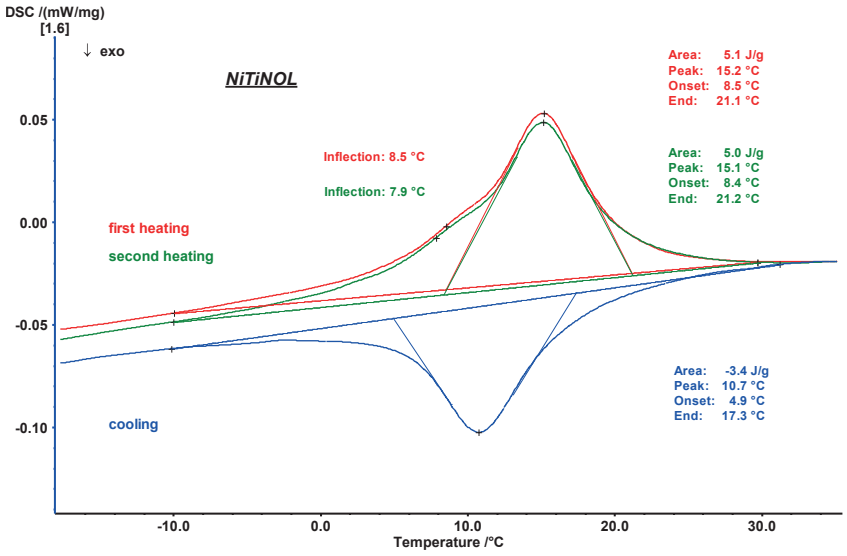
APPLICATION**SHEET**

Metals/Alloys · Electronics/Medical
DSC 204 ***F1*** *Phoenix®*

Shape Memory Alloy

Introduction

After a sample of SMA has been deformed from its "original" conformation, it regains its original geometry by itself during heating (one-way effect) or, at higher ambient temperatures, simply during unloading (pseudo-elasticity). These extraordinary properties are due to a temperature-dependent martensitic phase transformation from a low-symmetry to a highly symmetric crystallographic structure. Those crystal structures are known as martensite and austenite. The range of applications for SMAs has been increasing in recent years, with one major area of expansion being medicine: for example, the development of dental braces that exert a constant pressure on the teeth. However, these materials are not currently appropriate for applications such as robotics or artificial muscles, due to energy inefficiency, slow response times, and large hysteresis.



Test Conditions

Temperature range:	-50 .. 50°C
Heating/cooling rates:	10 K/min
Atmosphere:	Nitrogen at 40 ml/min
Sample mass:	5.34 mg
Crucible:	Aluminum, pierced lid

Test Results

The extraordinary properties of shape memory alloys are based on the structural changes. Every phase transition is associated with a heat exchange and can therefore be studied by means of DSC. The analysis of shape memory alloys with several heating and cooling cycles can not only determine the phase transition temperature, but also prove the reversibility of these phase transitions. Comparing the results of the 1st and 2nd heatings, the results confirm an identical peak shape and reversible values for the transition temperatures as well as for the transition enthalpy.

NGB · Application Sheet 120 · E · 0721 · Technical specifications are subject to change.

NETZSCH-Gerätebau GmbH
Wittelsbacherstraße 42 · 95100 Selb · Germany
Phone: +49 9287/881-0 · Fax: +49 9287/881505
at@netzsch.com · www.netzsch.com