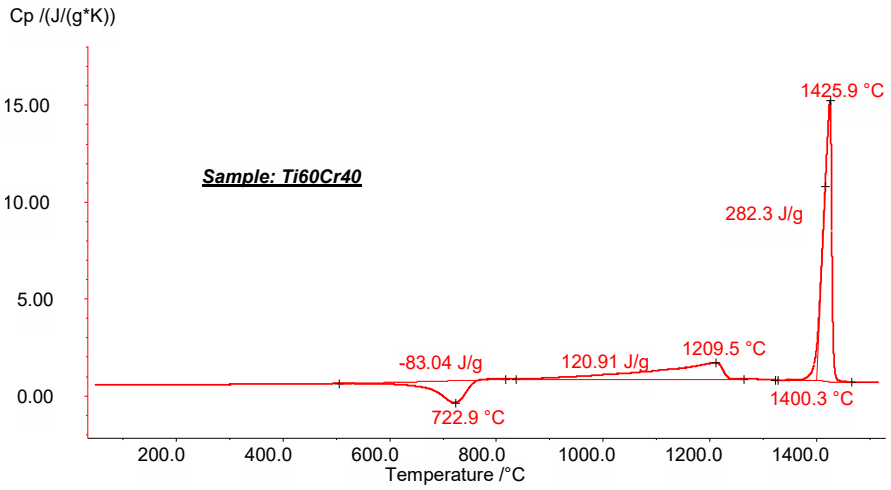
APPLICATION**SHEET**

Metals/Alloys · Aerospace
DSC 404 *Pegasus*®

Titanium Alloys

Introduction

Titanium alloys are metallic materials which contain a mixture of titanium and other chemical elements. Such alloys have a very high tensile strength and toughness (even at extreme temperatures), light weight, extraordinary corrosion resistance and the ability to withstand extreme temperatures. However, the high cost of both raw materials and processing limit their use to military applications, aircraft, spacecraft, medical devices, and some premium sports equipment and consumer electronics. The addition of chromium to titanium in concentrations exceeding 10 wt% helps improve the burn-resistance of titanium alloys. Above 15% chromium content, the alloys has sufficient chromium to resist burning in an aero engine environment to temperatures up to about 510°C. Furthermore, such alloys can be solidified in the partially amorphous form by radid cooling.



Test Conditions

Temperature range:	RT ... 1525°C
Heataing/cooling rates:	20/min
Atmosphere:	Argon at 50 ml/min
Sample mass:	83.06 mg
Crucible:	Pt with liner and coating
Sensor:	DSC type S

Test Results

Presented in the plot is the apparent specific heat of a titanium chromium alloy between room temperature and 1525°C. At 723°C (peak temperature), the specific heat is overlapped by the cold-crystallization of amorphous contents. The broad endothermal effect at 1211°C (peak temperature) is due to the transition for the α- to the β-phase. Melting of the alloy started at 1400°C. The heat of fusion was 282.3 J/g. Even in the liquid region, no overlapping oxidation and therefore no decrease in the measured specific heat was observed. This, however, can only be realized if extremely pure purge gases and special crucible arrangement (yttria coated crucibles) are employed for the tests.

NGB · Application Sheet 005 · E · 0521 · Technical specifications are subject to change.

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