

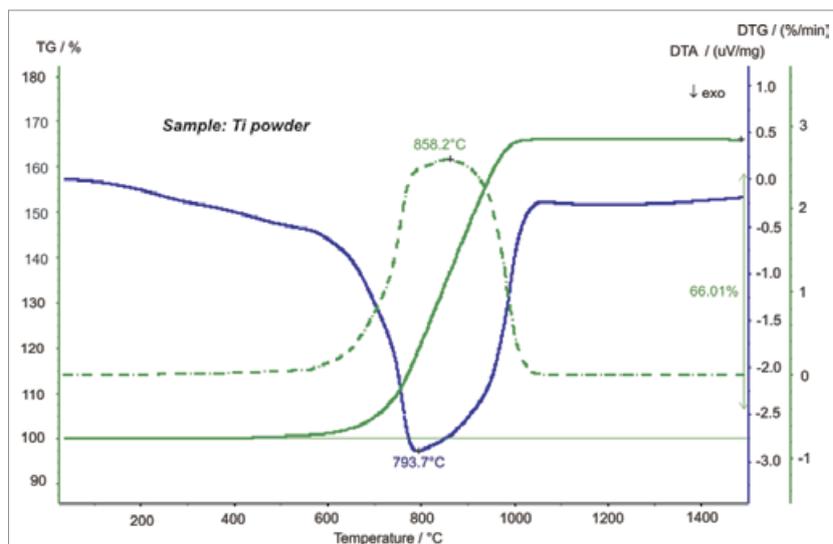
APPLICATION SHEET

METALS – AEROSPACE

TITANIUM

Titanium is a light lustrous, corrosion resistant transition metal with white-silvery metallic colour. It is often used in steels as alloying element. Because of the high tensile strength to density ratio, corrosion resistance and ability to withstand moderately high temperatures without creeping, titanium alloys are used in aircraft, armor plating, naval ships, spacecraft and missiles. Consumer products like hammer heads, tennis rackets, golf clubs or jewellery

can furthermore be made of titanium. Due to its biocompatibility, titanium is used for surgical implements and implants. Fine titanium powder is a source of bright burning with silvery sparks for fireworks. Last but not least, titanium compounds have also very important applications: For example, TiO_2 is a white permanent pigment for paints, paper, etc. and TiN is often used to coat cutting tools such as drill bits.



Instrument

STA 449 C Jupiter® – QMS 403 Aëolos®

Test Conditions

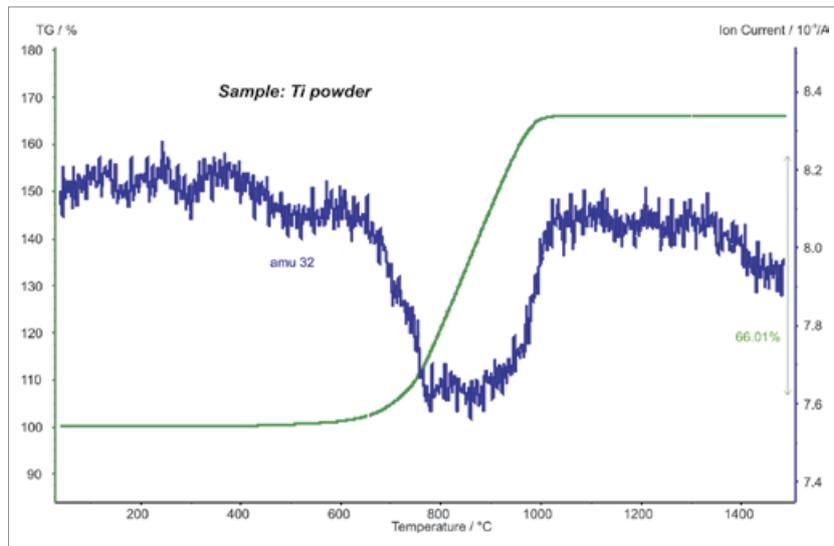
Temperature range	RT ... 1500°C
Heating/cooling rates	10 K/min
Atmosphere	synthetic air 70 ml/min
Sample mass	71.60 mg
Crucible	Al ₂ O ₃ beaker
Sensor	TG-DTA type S

Results

The figure depicts the temperature-dependent mass change (TG), rate of mass change (DTG) and DTA signal. The sample mass increased by 66% with a maximum rate of mass change at 858°C. The DTA signal exhibited an exothermic peak which is typical for oxidation. The mass spectrometer displayed a minimum for mass number 32 which reflects the consumption of O₂ during oxidation (see figure on page 2). Oxidation of titanium leads to an additional protective layer.

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