

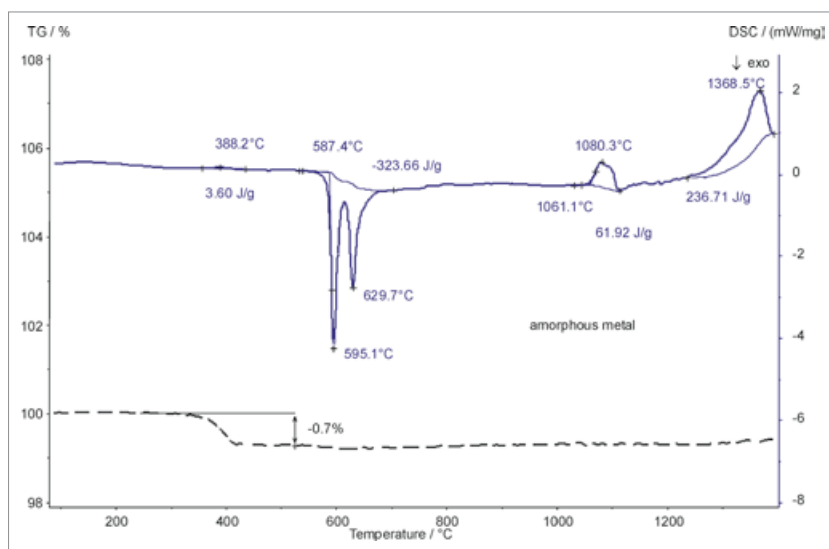
APPLICATION SHEET

AMORPHOUS METALS – METALS

AMORPHOUS FE ALLOY

An amorphous metal is a metallic material with a disordered atomic-scale structure and, in contrast to “normal” crystalline metals or alloys, in a glassy, non-crystalline state. Amorphous metals are usually alloys which were cooled very rapidly (vapor deposition, spinning etc.). They can be based on gold-silicon, zirconium, palladium, iron, titanium,

copper or magnesium. Ironbased amorphous alloys (Fe-Ni-Co-Si-B) show a higher strength than steel but are not ductile and can show a sudden failure. Applications could e.g. be in military use, but these materials find, of course, also employment in civil applications, for example, as sensors in safety systems because of their magnetic properties.



Instrument

STA 449 C Jupiter®

Test Conditions

Temperature range	RT ... 1400°C
Heating/cooling rates	10 K/min
Atmosphere	Argon at 60 ml/min
Sample mass	23 mg
Crucible	Pt with alumina liner
Sensor	TG-DSC type S

Results

This iron-based amorphous alloy showed a small mass loss step of 0.7% between 300°C and 400°C (probably evaporation of organic contamination). At 587°C (extrapolated onset), the alloy crystallized in two steps. The exothermic enthalpy was relatively high with 323 J/g. At 1061°C (extrapolated onset), an endothermic DSC peak was detected which could be due to a phase transition. Melting of the substance started around 1250°C with a peak temperature at 1368°C. The melting enthalpy was determined to 236 J/g. The melting peak, however, was not finished at 1400°C.