APPLICATION**SHEET**

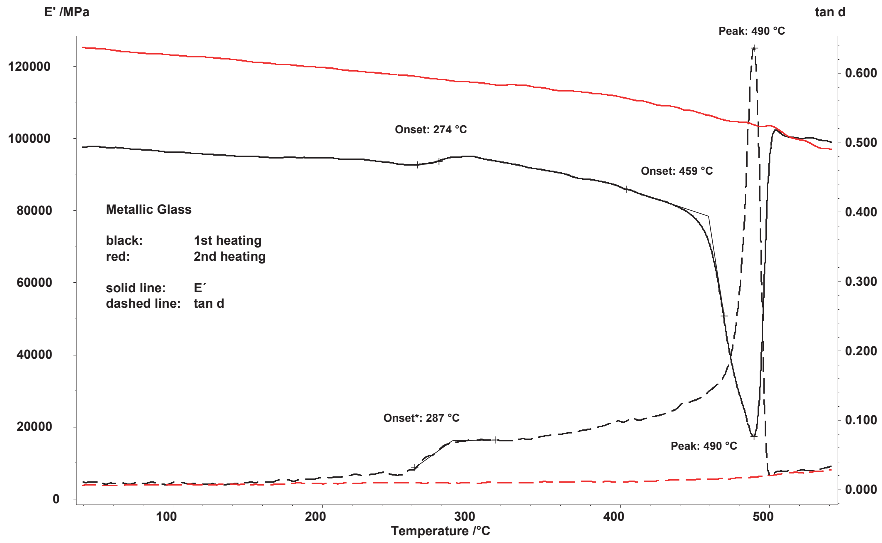
Metals · Research
DMA 242 E *Artemis*®

Metallic Glass

Introduction

Conventional metallic materials have a crystalline structure consisting of single crystal grains of varying size arranged in a microstructure. In contrast to this highly ordered structure, amorphous metals or so called "metallic glasses" are non-crystalline.

Metallic glasses with such a disordered structure can be prepared directly from the liquid state during cooling. However, there are several other ways in which amorphous metals can be produced. Metallic glasses exhibit an extraordinary combination of material properties. However, metallic glasses are very expensive. The applications are therefore limited to luxury goods or high-tech applications where the high price is not that relevant.



Test Conditions

Temperature range:	RT ... 540°C
Heating/cooling rate:	3 K/min
Amplitue:	±10 µm
Sample holder:	3-point bending, 20 mm
Frequency:	1 Hz
Proportional factor:	1.1
Max. dynamic force:	7.0 N

Test Results

The figure shows storage modulus E´ (solid curve) and loss factor tan δ (dashed line) of a metallic glass for two heating runs between RT and 540°C. During the first heating, a small step in the storage modulus was detected at 274°C (extrapolated onset) which might be related to a relaxation effect. The appropriate shoulder in the tan δ curve was at 287°C. The glass transition started at 459°C. The same effect can also be evaluated from the tan δ peak at 490°C. The metallic glass reached a minimum storage modulus at 490°C. Subsequently, a sharp increase in E´ was detected due to crystallization. The storage modulus of the second heating (red curve) exhibits no more transitions and the storage modulus is slightly decreasing with increasing temperature.

NGB · Application Sheet 169 · E · 0722 · Technical specifications are subject to change.

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