NiTi Shape Memory Alloys – New Materials Investigated with the Powerful DMA Method

This plot shows the complex modulus $E^*$ and loss factor $\tan\delta$ of a TiNi wire (shape memory alloy) as a function of temperature. With increasing temperature (heating rate: 3 K/min, test frequency: 10 Hz, tensile mode), the shape memory alloy undergoes the transformation from martensite to austenite at a material specific transition temperature of 100°C. At the transition temperature, a sudden increase in tensile modulus $E^*$ as well as a decrease in intrinsic visco-elastic damping $\tan\delta$ can be observed.

Temperature Dependence of Magnesium

The figure shows the complex modulus $E^*$ and loss factor $\tan\delta$ of a magnesium bar (thickness: approx. 2 mm, width: approx. 4 mm) as a function of temperature. With increasing temperature (heating rate: 2 K/min, test frequency: 10 Hz, modified single cantilever), the modulus decreases softly about 20%. The intrinsic damping shows a significant increase. A strong increase for $\tan\delta$ of about four orders of magnitude has to be noticed. This run shows the very high resolution of the $\tan\delta$ measurement due to the very high resolution and accuracy of the EPLEXOR®.