

Dma storage modulus curve analysis

Why is DMA used in mechanical analysis of polymeric materials?

In our opinion, DMA is a powerful technique used for the mechanical analysis of polymeric materials. It provides valuable information about the properties of materials, such as the elastic modulus, viscous modulus, and damping coefficient, and can identify small transition regions that are beyond the resolution of other techniques.

What is the difference between storage modulus and dynamic loss modulus?

The storage modulus is often times associated with "stiffness" of a material and is related to the Young's modulus, E . The dynamic loss modulus is often associated with "internal friction" and is sensitive to different kinds of molecular motions, relaxation processes, transitions, morphology and other structural heterogeneities.

Why is dynamic loss modulus important?

The dynamic loss modulus is often associated with "internal friction" and is sensitive to different kinds of molecular motions, relaxation processes, transitions, morphology and other structural heterogeneities. Thus, the dynamic properties provide information at the molecular level to understanding the polymer mechanical behavior.

What is the complex modulus obtained from a dynamic mechanical test?

Equation (7) shows that the complex modulus obtained from a dynamic mechanical test consists of "real" and "imaginary" parts. The real (storage) part describes the ability of the material to store potential energy and release it upon deformation.

What are the frequency-temperature master curves of dynamic shear storage and loss moduli?

Frequency-temperature master curves of the dynamic shear storage and loss moduli were constructed for the two neat polymers, with reference temperatures of 160°C and 180°C, respectively. Additional frequency-temperature master curves were created for the polymers containing various compositions of plasticizer.

How can DMA detect a viscoelastic variable?

DMA can detect and analyze viscoelastic variables like storage modulus, loss modulus, and loss tangent, as well as their dependence on temperature and frequency. The T_g and the temperature dependency of the modulus can both be studied via temperature dispersion measurements.

Dynamic mechanical analysis (DMA) is used to study these responses, called viscoelastic properties, under conditions of low applied mechanical force. ... For example, Figure 7 compares the storage modulus (E') curves for three different polymers that were obtained using a heating ramp rate of 3°C /minute and an oscillation frequency of 1 Hz ...

