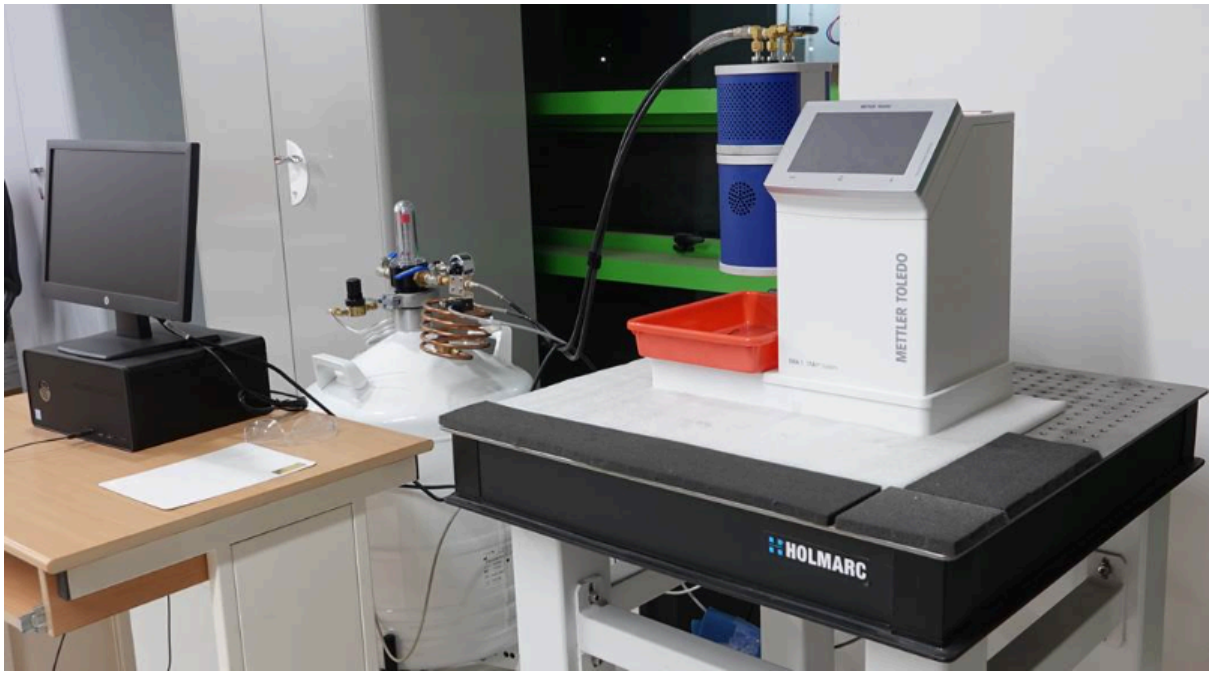
DMA 1

(Mettler Toledo)



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Dynamic mechanical analysis (DMA; Make: Mettler Toledo, Model: Star E systems) is an important technique used to measure the mechanical and viscoelastic properties of materials such as thermoplastics, thermosets and elastomers. In DMA, the sample is subjected to a periodic stress in one of several different modes of deformation. The force and displacement amplitudes and phase shift are analyzed as a function of temperature, time and frequency. DMA 1 has 10 N load cell with maximum displacement of 400 µm. It has the temperature range of -190 ºC to 600 ºC and frequency range of 0.1 Hz to 300 Hz.

The different deformation modes:

1. 3-point bending (A): This mode is used for accurate measurements of very stiff samples, such as composite materials or thermosets, particularly below the glass transition temperature. It is also very important for TMA measurements.

2. Single cantilever bending (B): This mode is excellent for bar-shaped materials (metals, polymers) that display a high degree of stiffness. The single cantilever approach is ideal for measurements below the glass transition temperature and is the recommended mode for determining the loss factor (tan delta) of powdery materials.

3. Dual cantilever bending (C): This mode is suitable for softer materials with a lower degree of stiffness, in particular thin samples such as films.

4. Tension (D): This is the usual deformation mode for films or fibers. It is also very important for TMA measurements.

5. Compression (E): The compression mode is used to measure foams, gels, and foodstuffs and for static force (TMA) measurements.

6. Shear (F): The shear mode is ideal for soft samples, such as elastomers, pressure-sensitive adhesives.