

Characterization of glass transitions of different polymers by DSC

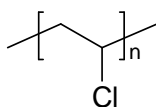
Introduction

Glass transition is the transformation of a solid or liquid polymer into a vitreous state. This state is characterized by a modification of the polymer physical properties such as viscosity, thermal expansion or heat capacity. The glass transition temperature (T_g) is easily determined by DSC. The ISO1135762 standard describes the experimental T_g determination for polymers

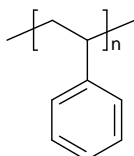
Experimental

Samples:

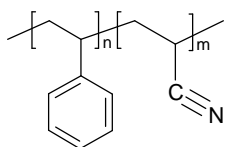
PolyVinyl Chloride (PVC)



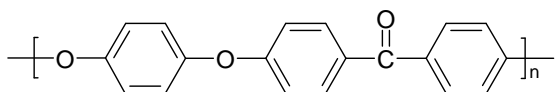
PolyStyrene (PS)



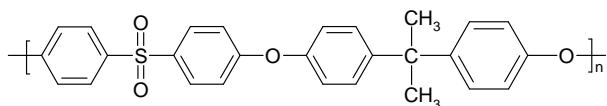
Poly Styrene/AcryloNitrile (SAN)



PolyEtherEtherKetone (PEEK)



PolyEther Sulfone (PES)



DSC 131 Evo experimental conditions:

Atmosphere: Nitrogen, atmospheric pressure

Sample mass: about 25 mg in a 100 μ l sealed aluminum crucible

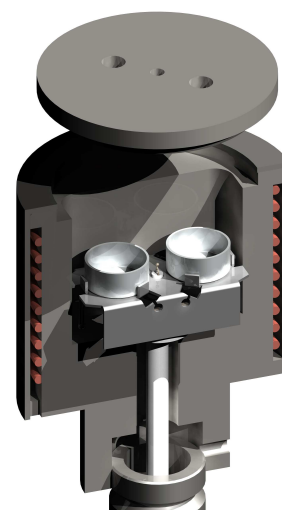
Experimental procedure:

The temperature is programmed from room temperature up to 300 $^{\circ}$ C at 10 $^{\circ}$ C.min $^{-1}$.

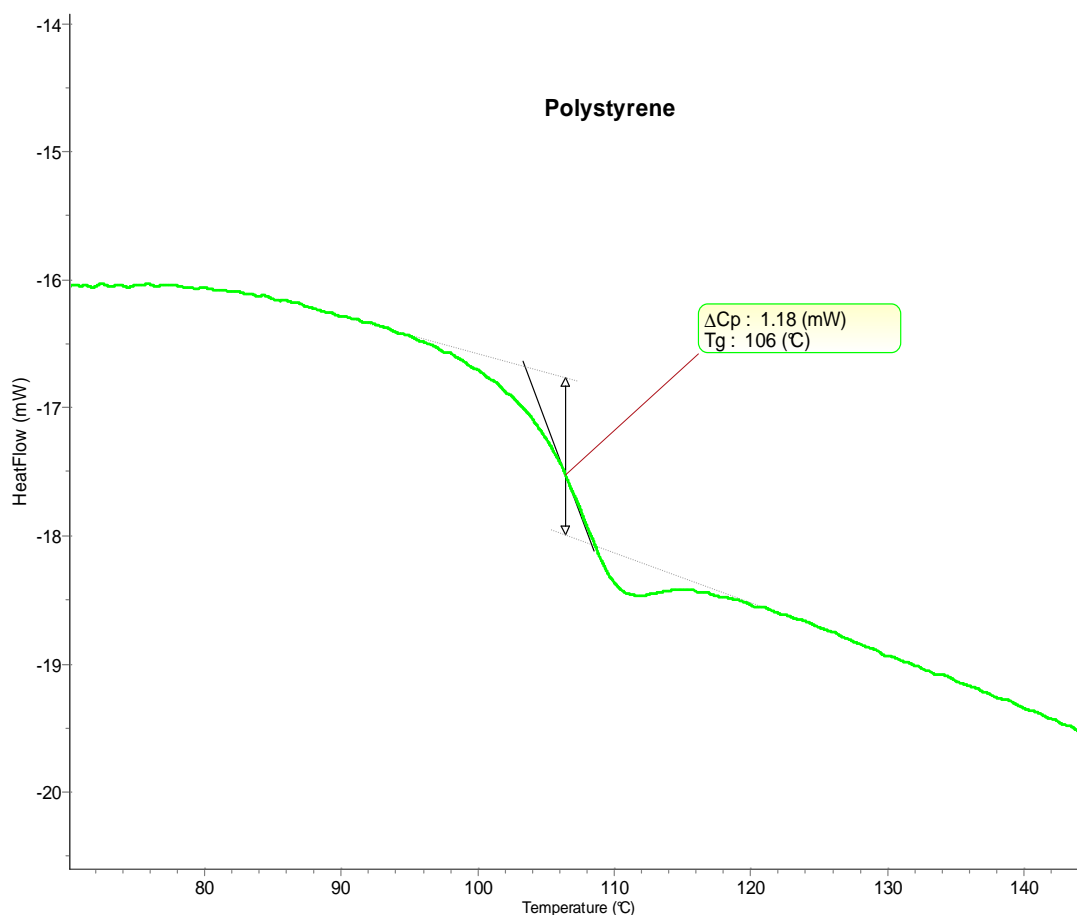
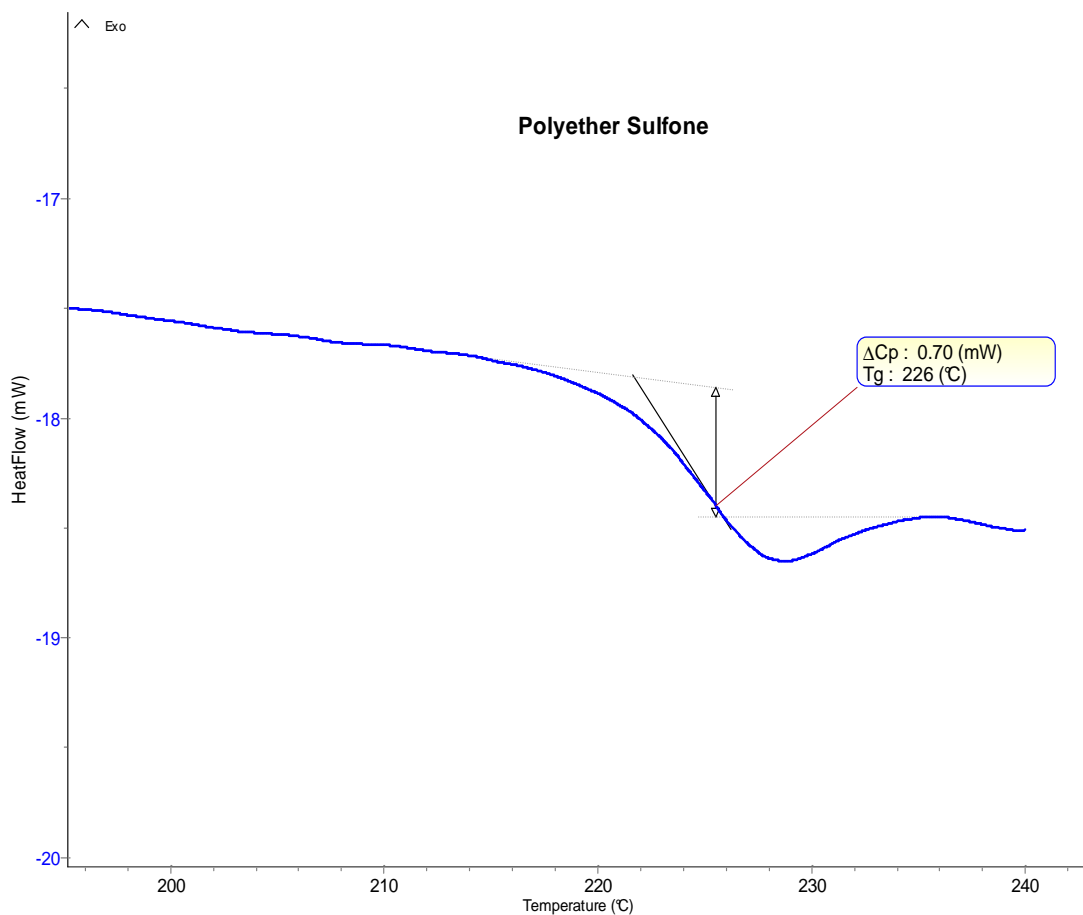
Instrument

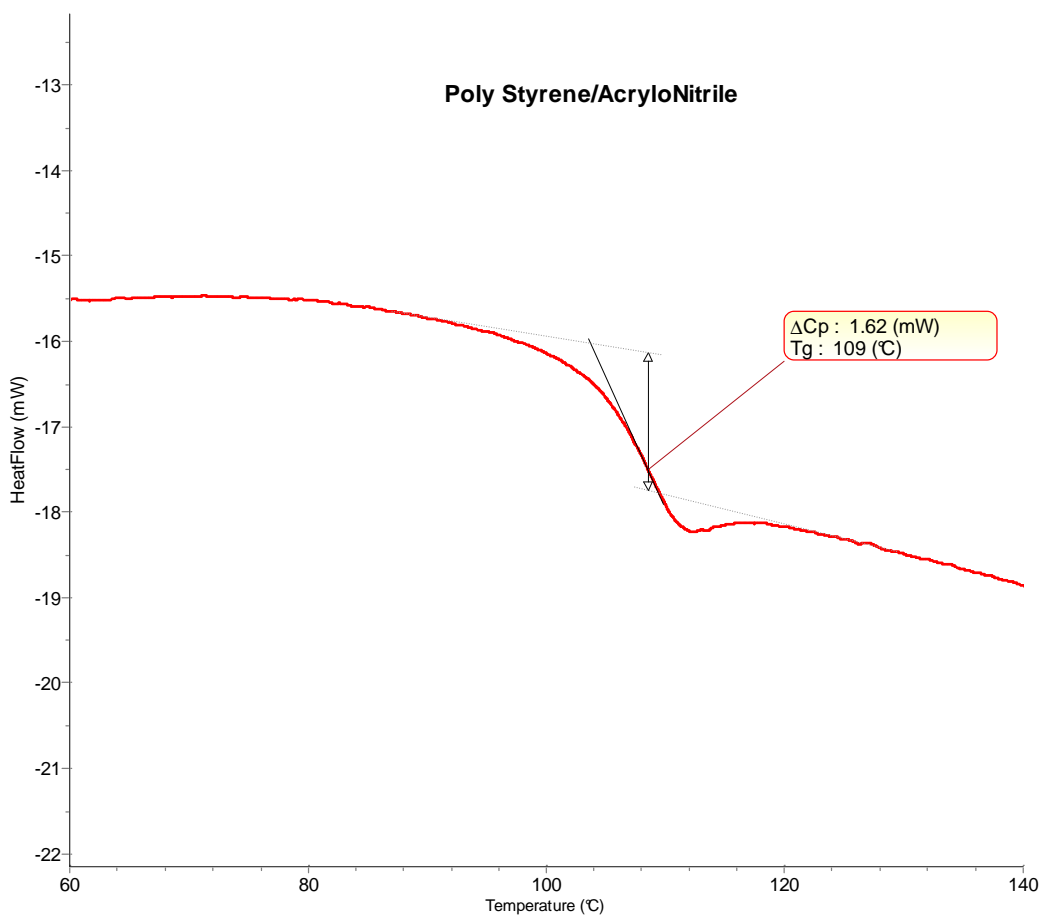
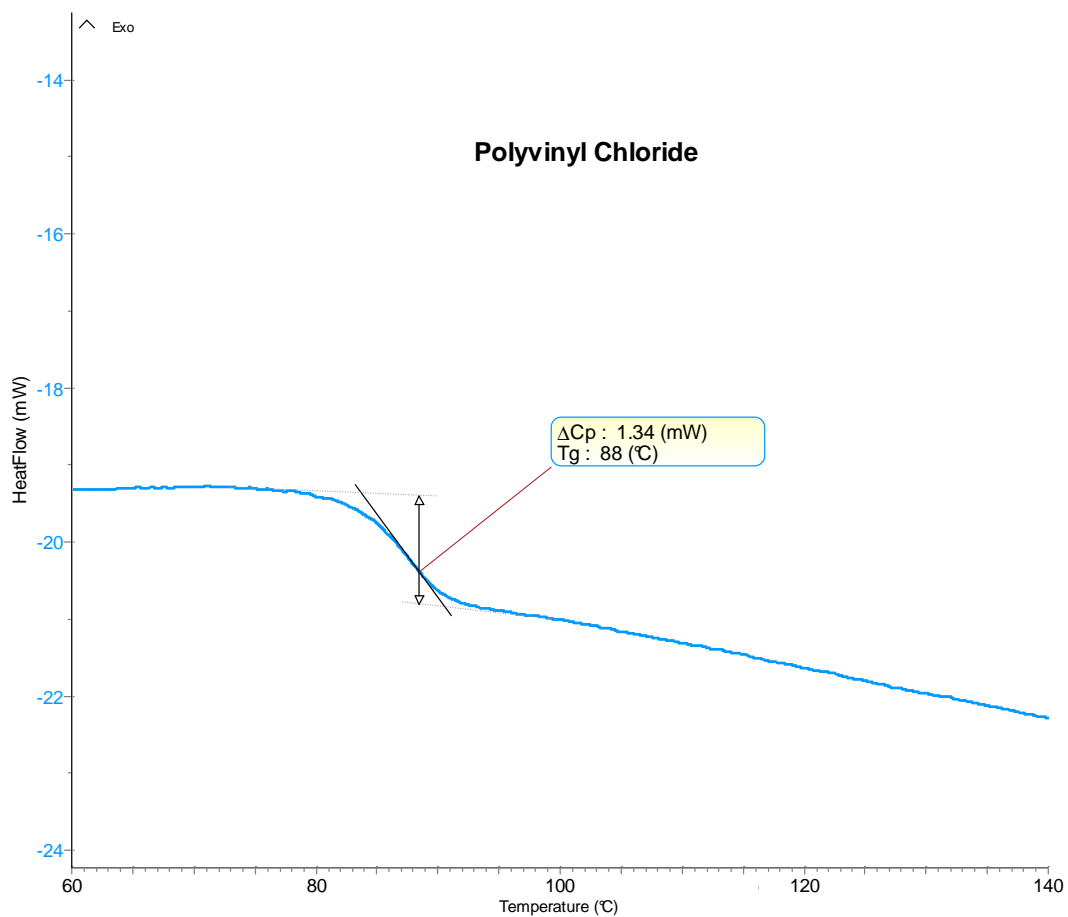
DSC 131 Evo

-170 up to 700 $^{\circ}$ C

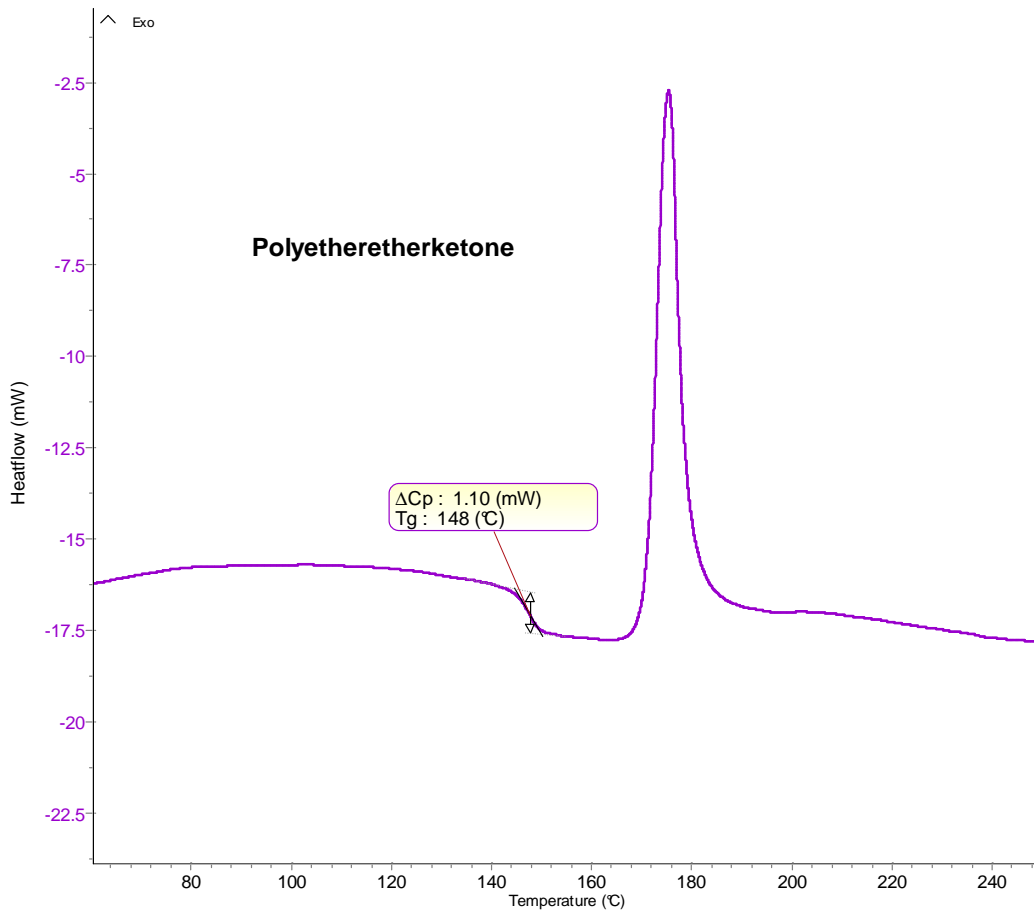


DSC 131 Evo Sensor with aluminum crucibles





Polymers



Results

The glass transition temperature corresponds to a shift of the base line which is proportional to the heat capacity variation (ΔC_p). The temperature and the shift depends on the type of polymer.

In this study, PES has the highest T_g (226 $^\circ\text{C}$) and PV C has the lowest (88 $^\circ\text{C}$).

