

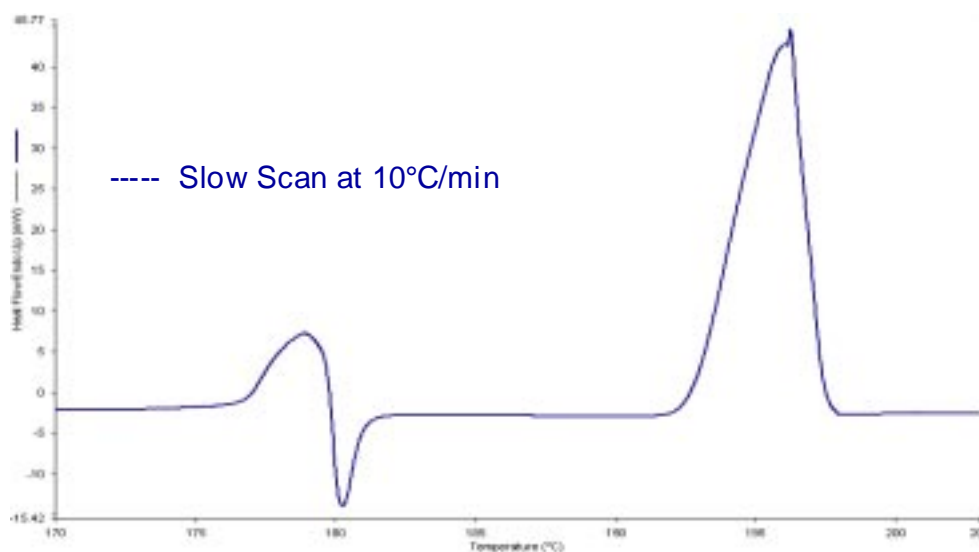
The effect of HyperDSC on the study of the polymorphic transitions of Carbamazepine

Many pharmaceutical materials exhibit polymorphism. This means that it is possible for the crystalline form to exist in two or more states, this is often dependent on the processing conditions that the pharmaceutical has experienced.

These crystalline states, commonly known as forms, can exhibit different levels of stabilities and an unstable form can melt at a temperature that differs to the melting temperature of the more stable form.

Unstable forms may also have the ability to recrystallise to give a higher melting more stable form as they are scanned in the DSC.

An example of this type of behaviour is shown below



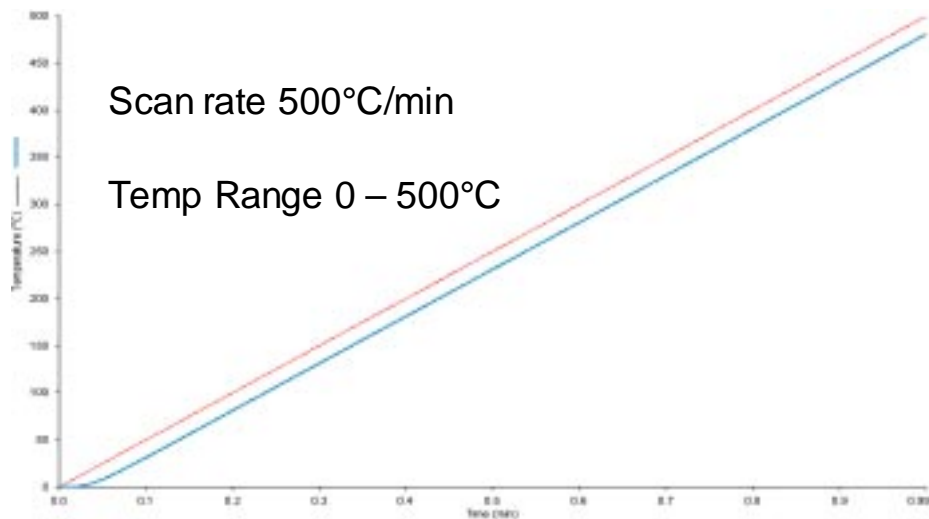
In the thermogram above, the sample is scanned at the conventional DSC rate of 10°C/min. The sample first melts at approx 175°C and then recrystallises very quickly, the second more stable form then melts at approx 193°C and then a third form melts within a short temperature range.

It is because of the ability of the sample to recrystallise that it is very difficult to know whether the sample exists in a single form after processing or whether more than one form was produced. If it is possible to prevent this recrystallisation then it will become clear as to whether there is one form or a mixture of forms produced. HyperDSC offers the potential to scan at rates that prevent this recrystallisation.

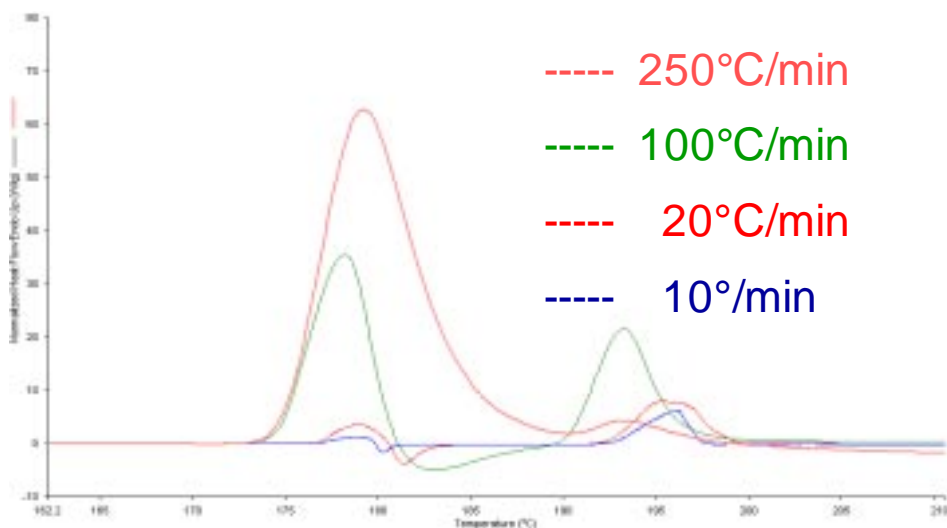
HyperDSC Application note

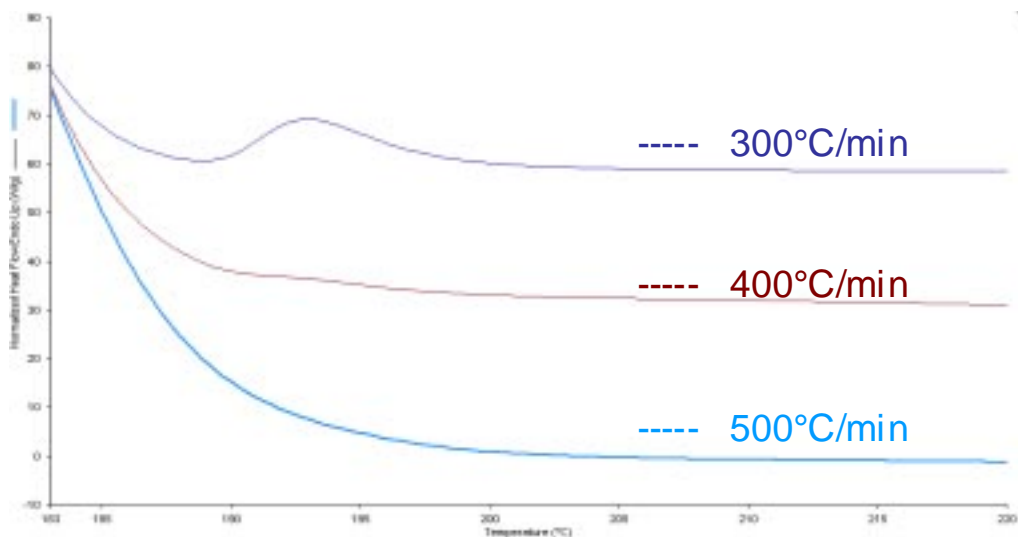


HyperDSC allows the use of scan rates upto 500°C/min to analyse the melting behaviour of the materials whilst maintaining control of the heating rate. This is shown in the thermogram below



The sample of carbamazepine shown previously had been processed to have just one crystalline form (Form III). However it was found that scan rates in excess of 400°C/min were required to stop any further recrystallisation of the sample after the melt of the material provided. The data obtained for this sample is shown in the thermogram below and it can be seen that even at 250°C/min the sample still recrystallises to produce a higher melting form





A Thermogram of the tail of the main melting peak at high heating rates, showing that at 500°C/min there is no higher melting form

The thermogram above shows that only at scan rates in excess of 400°C/min is it possible to prevent recrystallisation taking place and allow the true identification of the form produced.

Acknowledgements:

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