Application Note B-TA1007

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TA1007 - DSC measurement of friction ballpoint pen

Introduction

The friction ballpoint pen can erase the characters once written with a special eraser. This utilizes the property that the color of the ink becomes colorless and transparent due to the heat generated by friction. By measuring the characters written with a friction ballpoint pen with a sample observation DSC, we investigated how the color of the ink changes with increasing temperature.

Measurement and analysis example

Using a friction ballpoint pen, a piece of paper with character of “R” was placed in a sample crucible, the temperature was heated up to 80°C at 10°C/min in nitrogen atmosphere, and then the temperature was cooled down to -50°C. Figure 1 shows the results of DSC equipped with a sample observation function. From the sample observation images, it can be seen that the ink color which was clearly visible at 30°C, gradually faded from around 50°C, and the ink color completely disappeared at 60°C accompanied with an endothermic peak observed around 60°C.

After the temperature heating process up to 80°C, the color of the ink remained disappeared even at the ambient temperature of 30°C during the cooling process. The temperature continued to drop, and the ink color gradually was revived when the temperature exceeded -20°C, and the original ink color could be observed around -40°C accompanied with an exothermic peak.

In this way, it was confirmed that the ink color used in the friction ballpoint pen disappears or revives depending on the temperature.

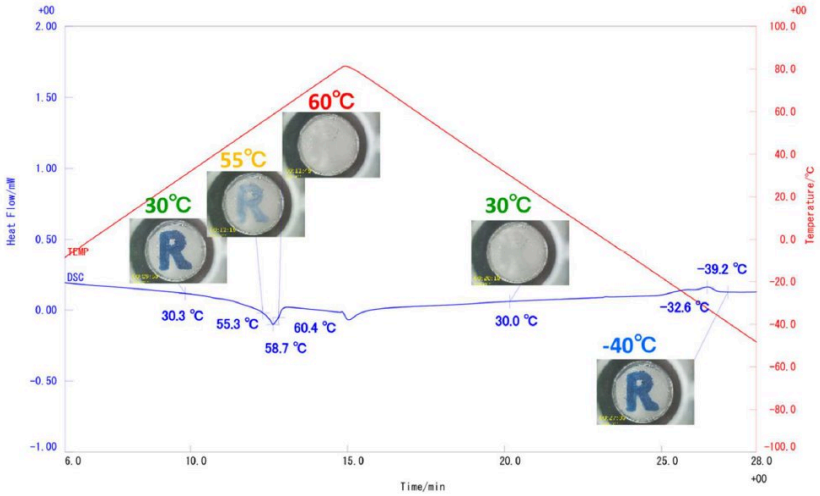

Figure 1: TG-DTA results and sample observation images

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