

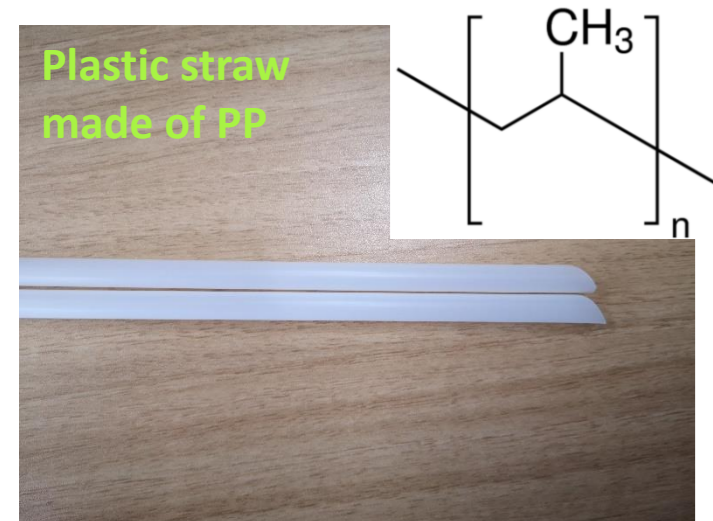
## 1. Introduction

The discovery of polymers that has lead to the production of plastics have made our daily living convenient because of their high functionality. However, they are related to waste disposal problems, Increase of marine plastic pollution, climate change and have become a global issue. With this issue at hand, the production and use of biodegradable plastics has increased.

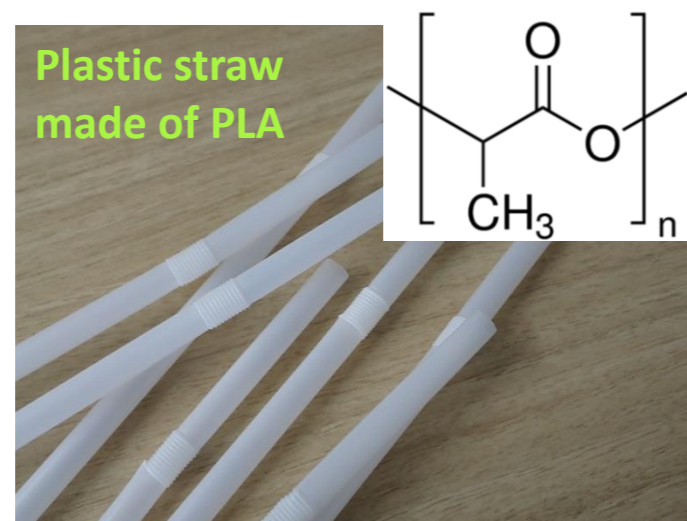
PLA or polylactic acid is one of the common sources of biodegradable polymers which is produced thru fermentation by microorganisms that uses plant oils as raw material. Here, we compare the results of PLA straw obtained by Rigaku TMA8311, DSCvesta and sample observation STA8122..

## 3. Materials

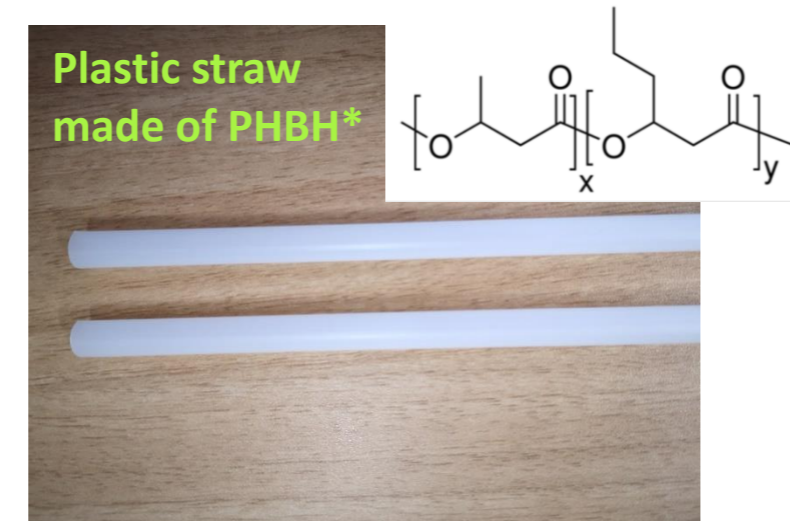
### Polypropylene (PP)



### Polylactic acid (PLA)



### Polyhydroxybutyrate-co-3-hydroxyhexanoate (PHBH)



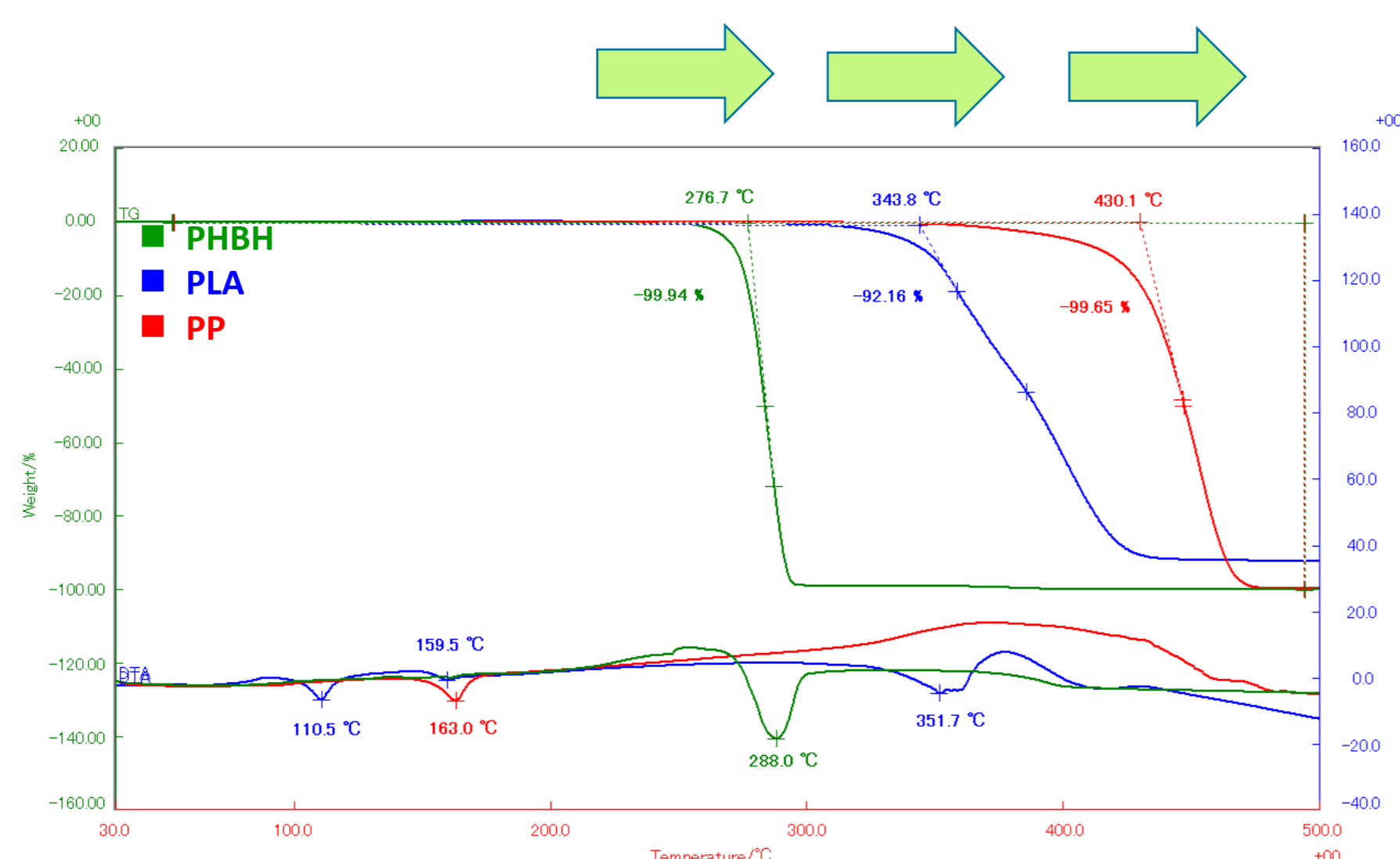
## 2. Instrumentation



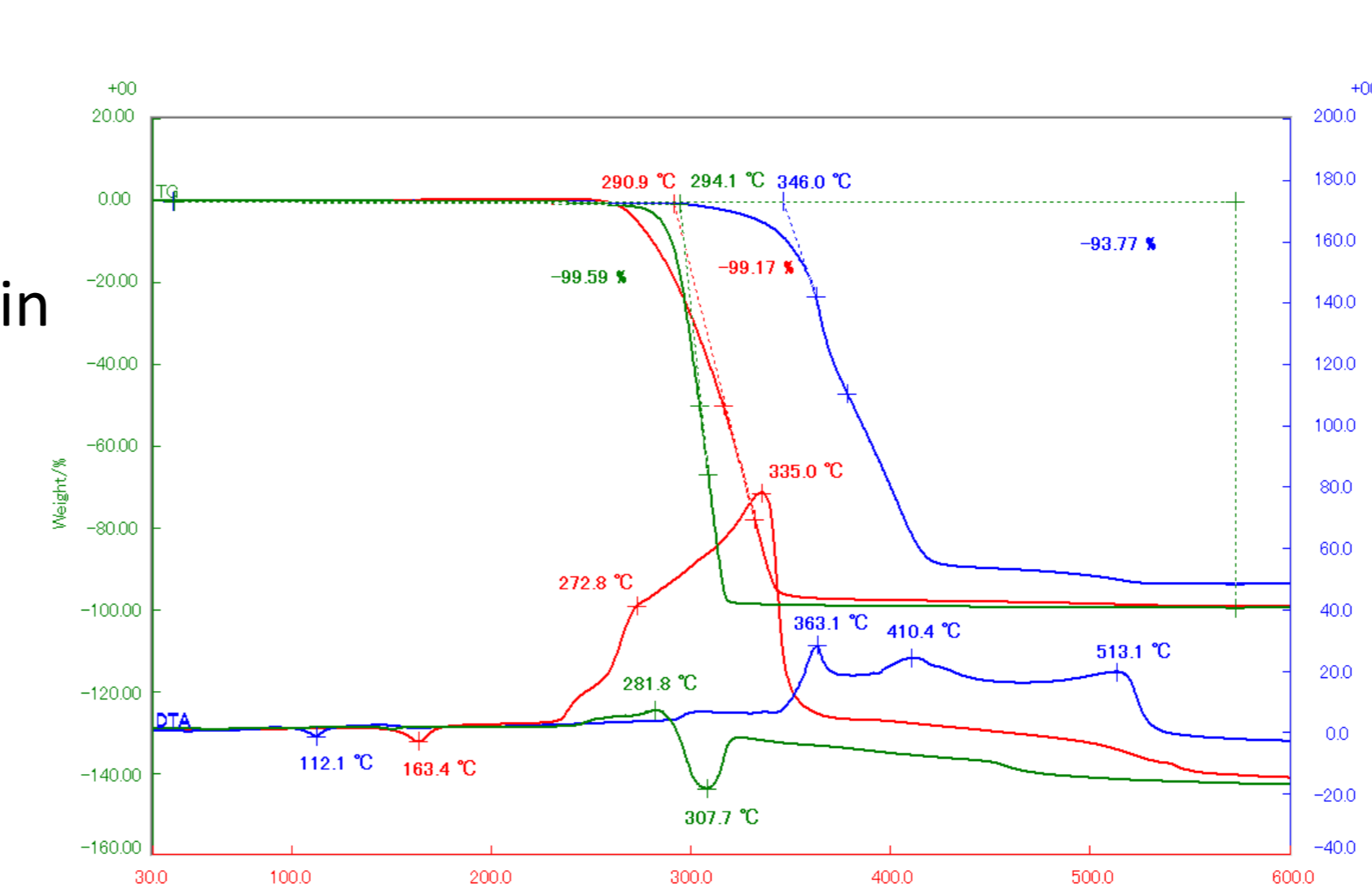
## 4. Results and Discussion

### 4-1. Plastic straw made of PP, PLA and PHBH by STA8122/C

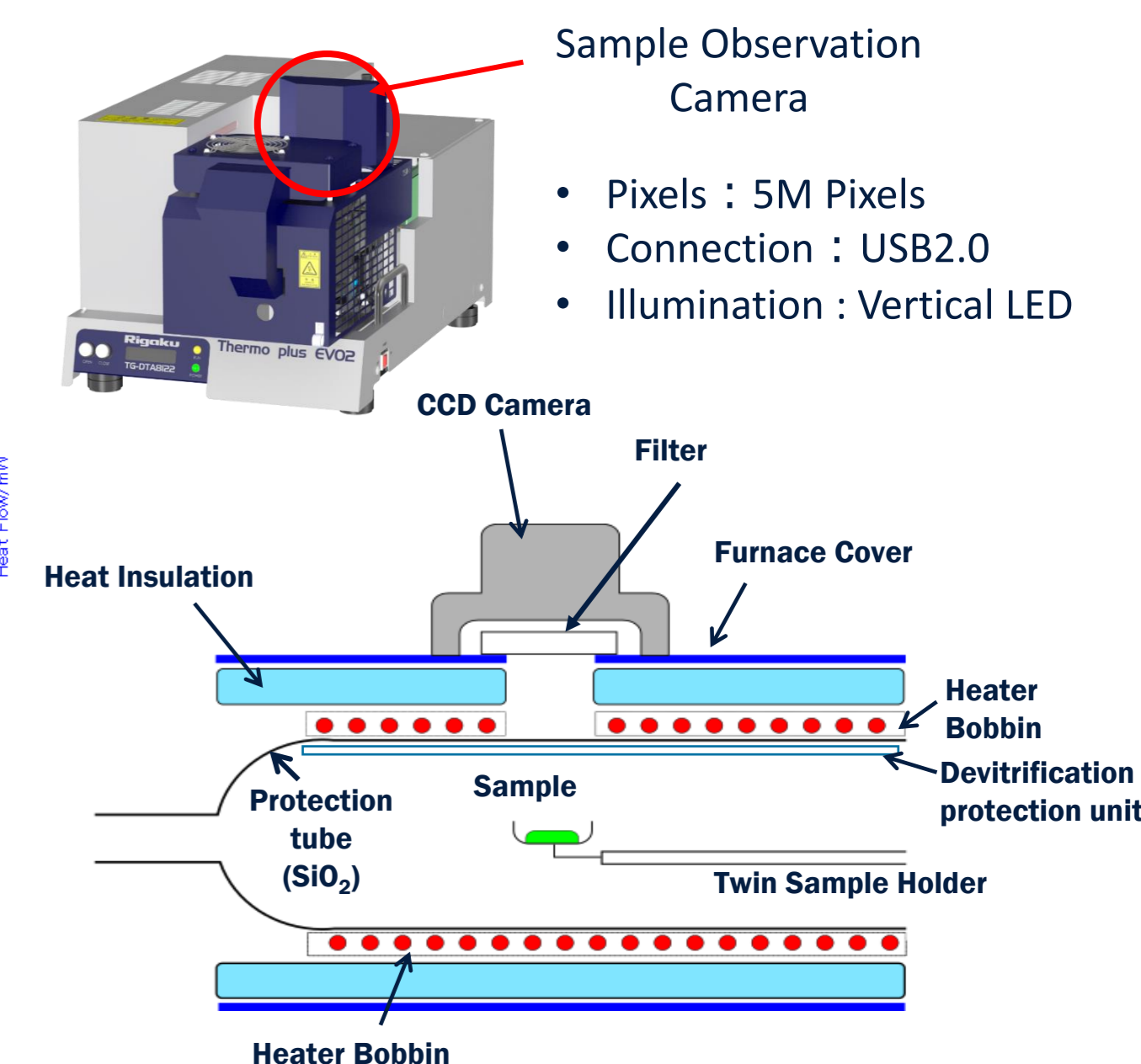
Amount: 4~5mg  
RT~600°C  
20°C/min  
N<sub>2</sub> flow 300ml/min



Amount: 3mg  
RT~600°C  
20°C/min  
Air flow 300ml/min

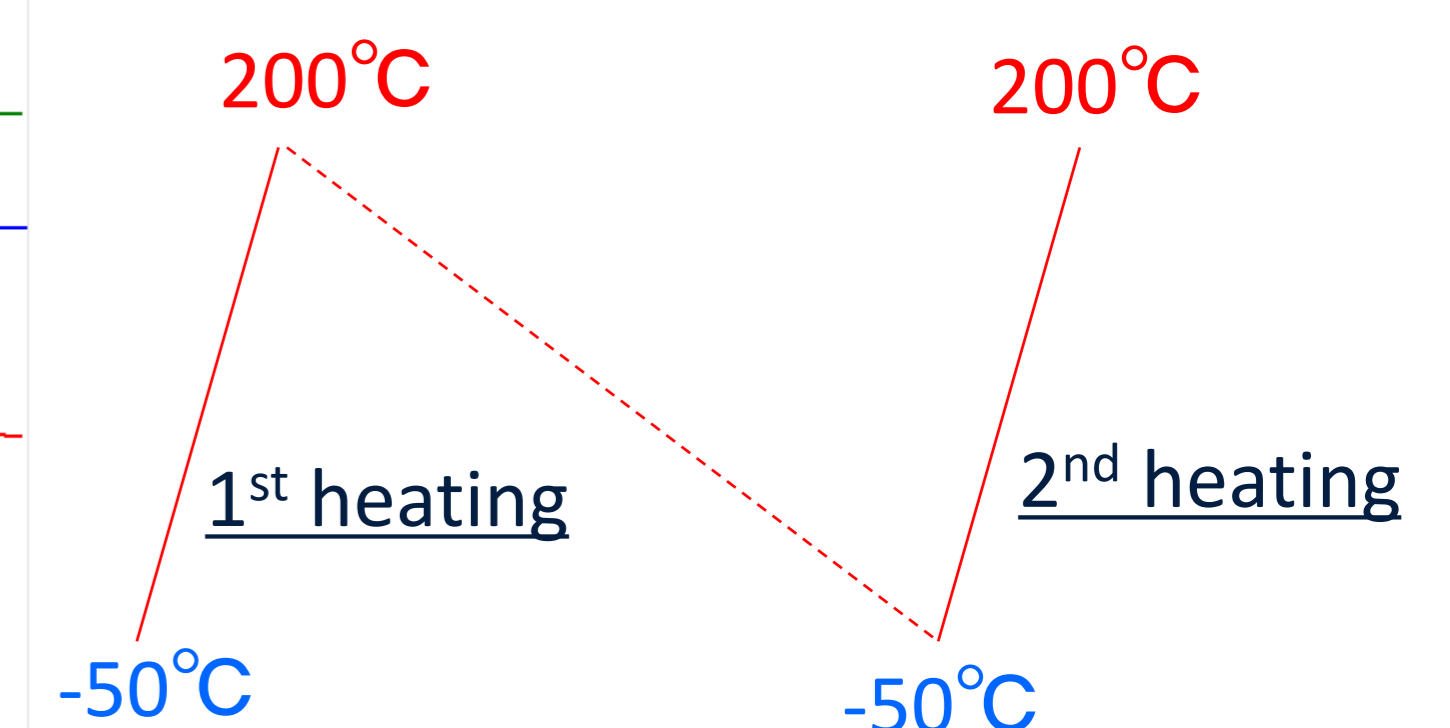
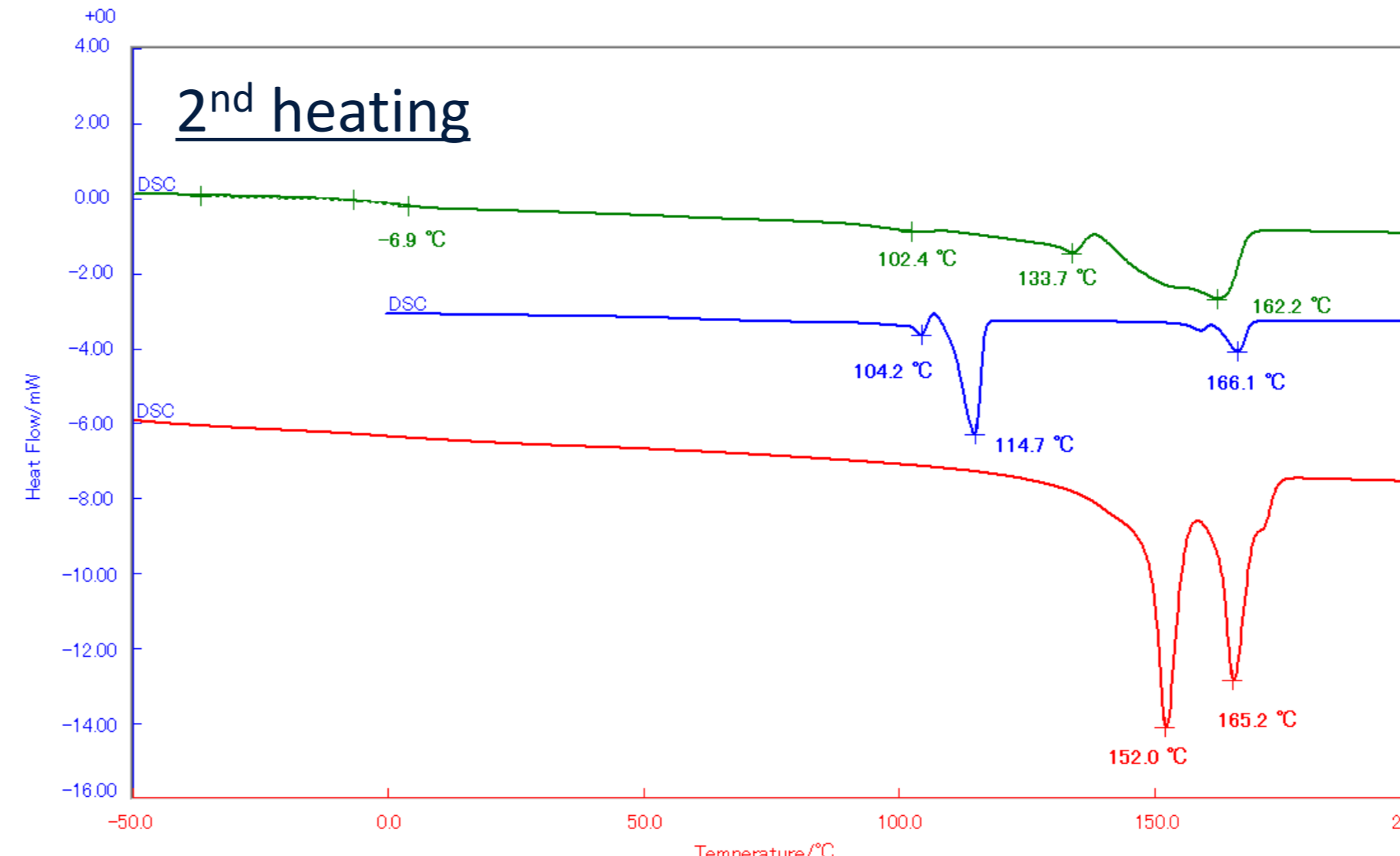
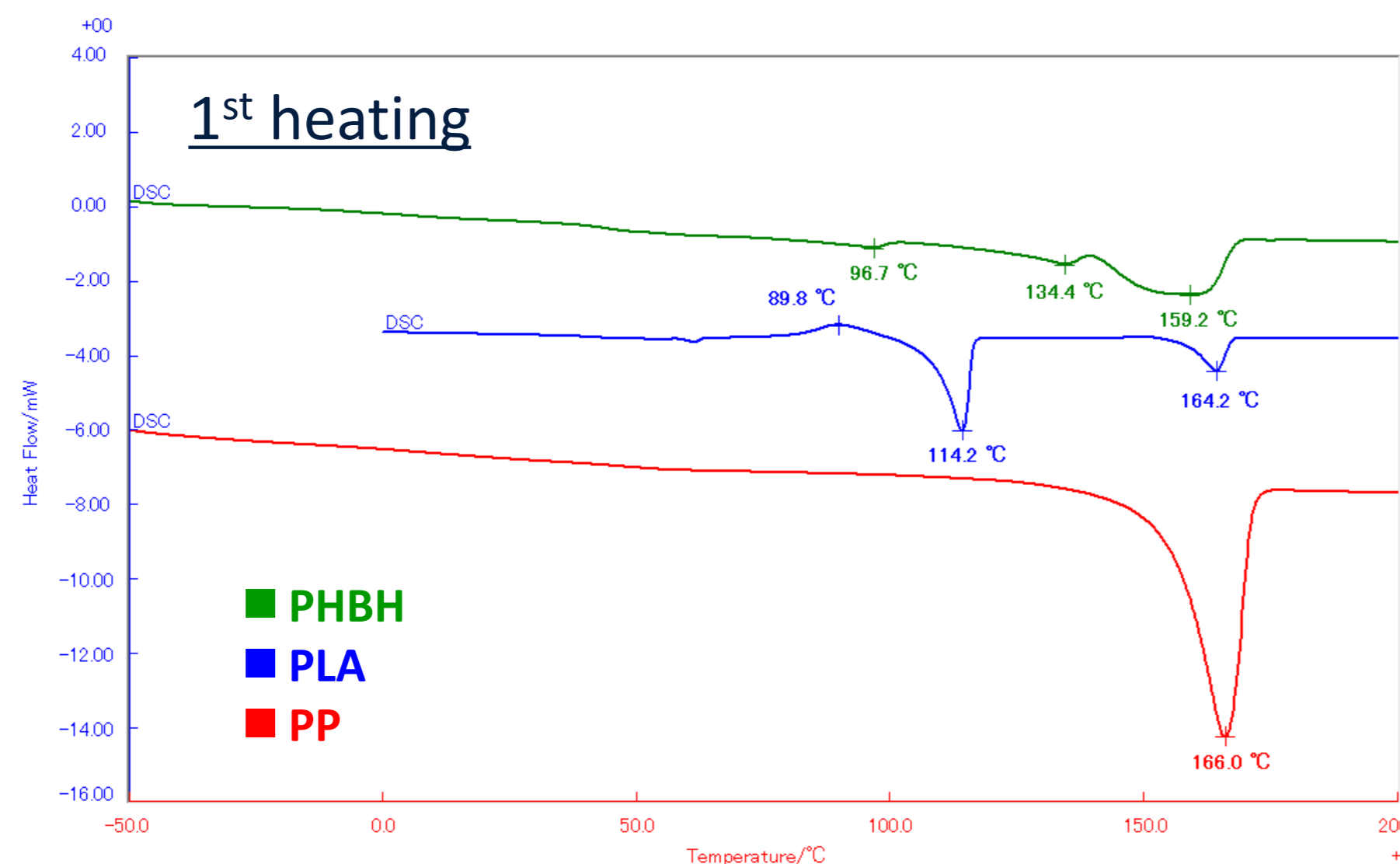


### Sample Observation STA RT~1000°C



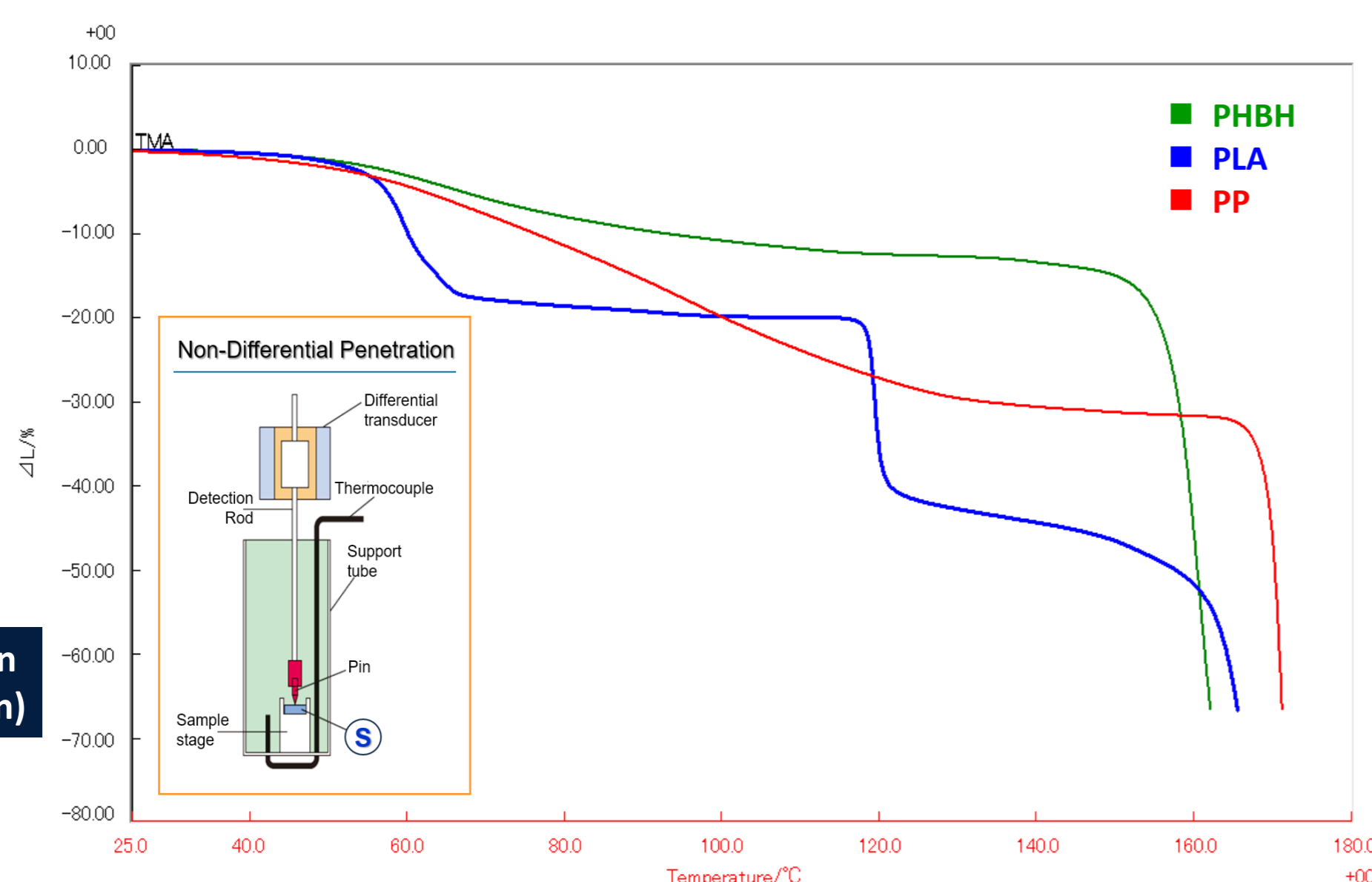
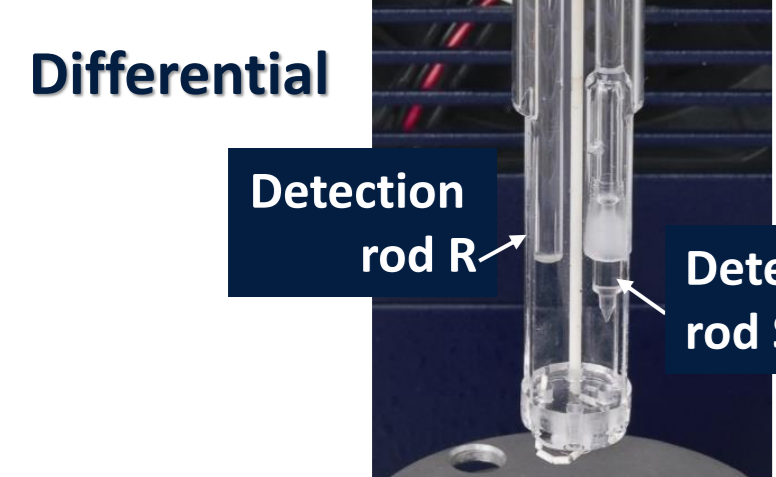
### 4-2. Plastic straw made of PP, PLA and PHBH by DSCvesta/C\*+ASC

Sample amount: 5mg  
Heating rate: 10°C/min  
Cooling rate: 5°C/min  
Temperature range: -50°C~200°C

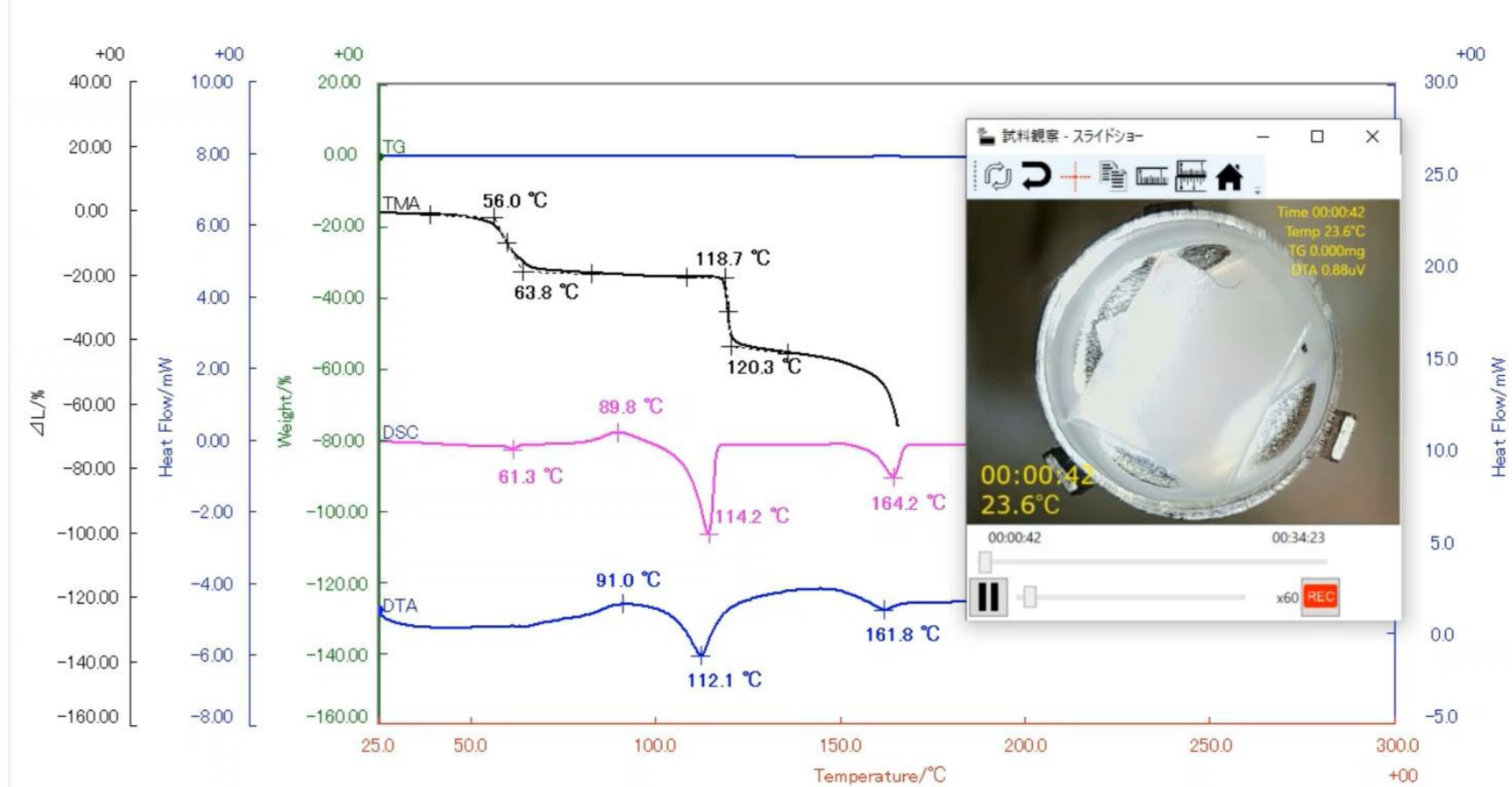


### 4-2. Plastic straw made of PP, PLA and PHBH by TMA8311

Sample thickness: 0.15mm  
Load applied: 200mm  
Mode: non-differential penetration method  
Temp range: RT~180°C



### 4-3. Plastic straw made of PLA by STA, DSC and TMA



## 5. Conclusion

By comparing multiple simultaneous measurement data from STA, DSC, and TMA equipped with unique attachments, not only conventional single data results, but also beneficial results that complement each other's information are obtained.

In addition, the sample observation function makes it possible to track changes in the actual color, shape, and volume of the sample in real time with live-capture images.