Cloud point measurement of oil using sample observation DSC

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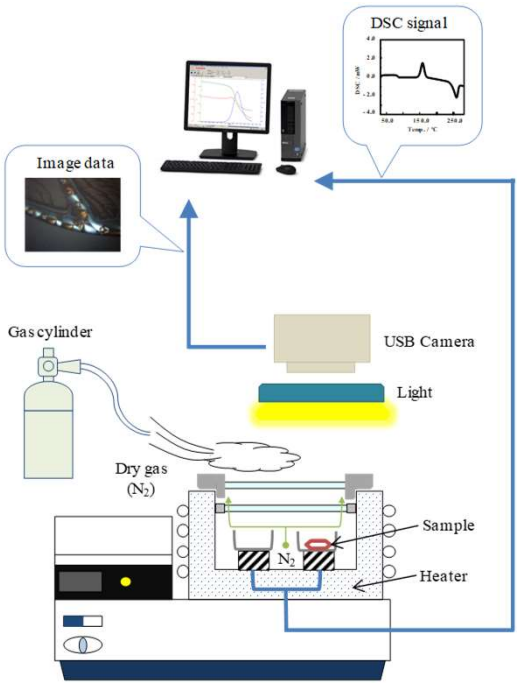
Introduction

We have proposed the sample observation function using optical camera recently, which can links sample images with analyzing signals. lids with transparent windows enable observation of sample condition. Transparent component parts are used in the device to enable the state of sample to be photographed. However measurements from minus temperature sometimes are difficult because it is easy to cause dew condense on the part that exposures the open air.

In this study, we installed a heater function on DSC configuration in order to prevent dew condense and try to measure the measurement from minus temperature range. Cloud point of oil was measured as a model subject and we investigated the difference between the brand new and used one.

Differential scanning calorimeter
DSC7000X
with Real View System

Configuration



Equipment has two transparent lids made by quartz instead of metal to observe sample using USB camera. Drying gas is flowed over the upper lid to prevent dew condensation.

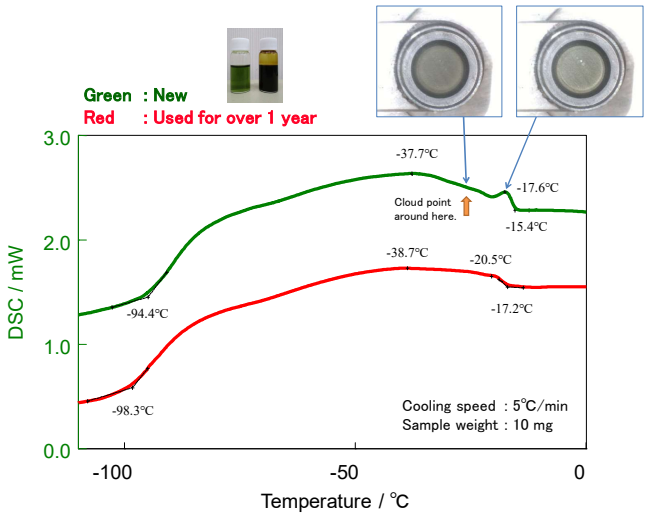
Effect of dry gas blowing

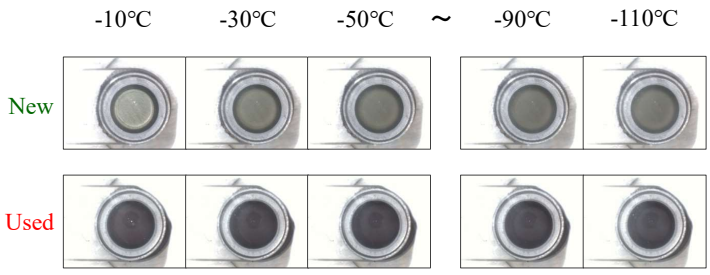
Gas blowing	0℃	-20℃	-40℃	-60℃	-80℃	-100℃
OFF						
ON						

*The temperature at which the lid begins to be fogged up depends on temperature and humidity of room

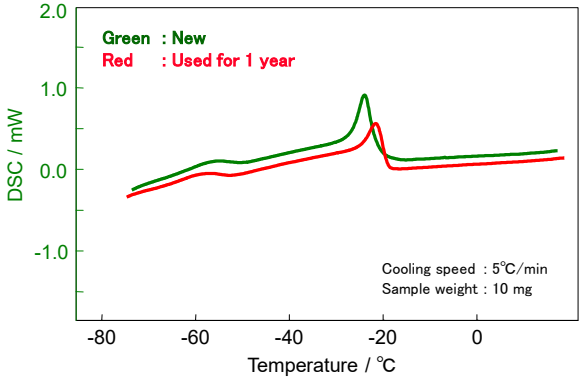
Results

Engine oil





Lubricating oil for rotary pump



Conclusions

- Sample observation of DSC measurement expands the capability of performing even at -100 ℃ or lower by blowing dry gas in order to prevent directly contact between transparent lid and open air.
- In the case of a transparent samples close to colorless, cloud point measurement was possible by sample observation DSC measurement. In the case of a sample with a dark color, the cloudiness associated with the cloud point was not clearly observed.
- When new and used engine oil and lubricating oil for rotary pump were measured, the temperature of the crystallization peak of engine oil decreased with use but that of lubricating oil increased.
- The temperature of engine oil when the cloud point was observed in the image appeared in the middle of the crystallization peak. There was no inflection of the DSC signal due to the cloud point.

The 8th International and the 10th Japan-China Joint Symposium on Calorimetry and Thermal Analysis (CATS-2017), November 2-4, 2017, Fukuoka University