Technical Report

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TA No.115 Thermal Analysis and Dynamic Mechanical Analysis product line

Evaluation of yellowing of the transparent resin by color analysis

2019. 12

During the testing in the STA, DSC, or DMA, the ability to observe physical changes is useful. Real view allows this and plays a major role on confirming the changes in the sample's color or shape during the experiment. Color changes are often slow, making it hard to judge the timing of the change. Quantifying the color of image makes it possible one to detect the slight color change without worrying about variation due to operator influence.

Polymethyl Methacrylate(PMMA) and polycarbonate(PC) are used for window glass for automobiles and trains. However, they easily deteriorate and turn yellow due to UV or thermal exposure. Real View can be used to characterize this yellowing during an STA run by calculating the L*a*b* function for color analysis.

Simultaneous Thermogravimetric Analyzer
（TG-DSC）NEXTA® STA200RV

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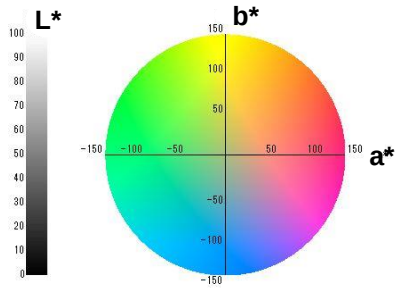
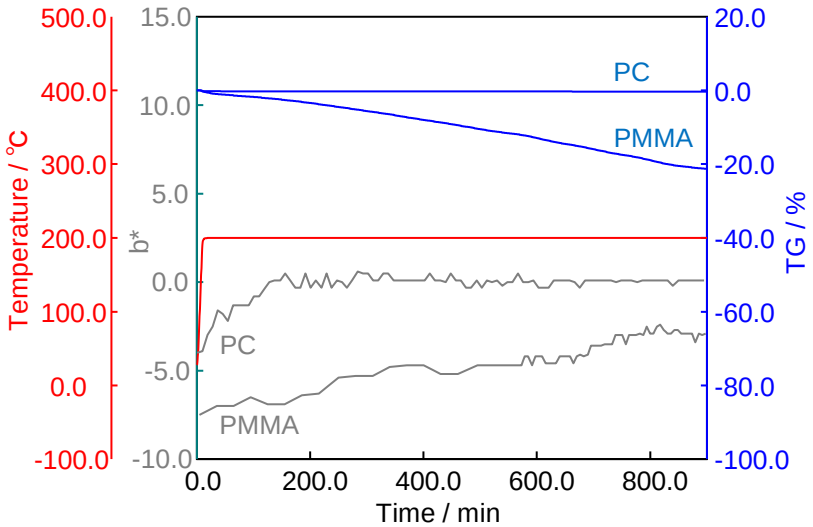
Results



L*a*b* color space expresses color as three values: L* for luminosity, and a*and b* for chromaticity. As the figure to the left, the *a** axis represents the green–red component, with green in the negative direction and red in the positive direction. On the *b** axis, the negative value stand for blue and positive for yellow.

By focusing on the change in the b* value, we can evaluate the yellowness of the sample.



Result of PC and PMMA (isohold at 200 ℃)

In contrast from the gentle and continuous increase in b* vale for PMMA, PC's b* value increases rapidly in the first 200 minutes and then stabilizes at that value.

The TG data shows that this behavior tracks with the weight loss. PMMA continues to loss weight across the experiment while PC remains constant.

These color changes are hardly visible to the human eye. By qualifying in terms of L*a*b* and displaying this graphically, these faint color changes can be evaluated without concern for operator differences.