A Characteristic of Dendrimer-acrylate

Y. Saruwatari
Osaka Organic Chemical Industry LTD., Katayama-Cho, Kashiwara City, Osaka, Japan

***Abstract*-- We established composition of Dendrimer-acrylate. We examined behavior of the ultraviolet rays hardening. In comparison with the general acrylic monomer, the increase of the cure rate, the decrease of the oxygen obstruction, decrease of the hardening shrinkage were confirmed. In addition, the provided film understood that I was superior in hardness and the softness.**

I. INTRODUCTION

The development of acrylic materials developed with establishment of the ultraviolet rays hardening rapidly from about 1970. The ultraviolet rays hardening is the technology that is important in electronic materials now. Application of the ultraviolet rays hardening is coating, the adhesion, sealing, and patterning. The ultraviolet rays hardening system by acrylic materials has good and bad points to show as follows.

good points	bad points
Hardening is fast	Shrinkage is high
Film is transparent	Oxygen obstruction
Cost is low	Weather ability is low
etc	

TABLE 1.
Good and bad points of UV Hardening.

Dendrimer-acrylate is the superior acrylic oligomer which can solve these bad points.

II. COMPOSITION OF DENDRIMER-ACRYLATE

V#1000 : We composed dendrimer of the polyol which assumed a hydroxyl group a branch molecule. I made a hydroxyl group of the polyol ester with acrylic acid and composed dendrimer-acrylate.

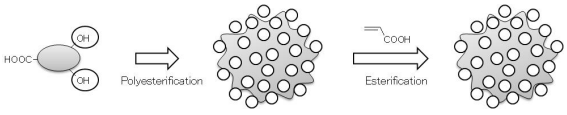

FIGURE.1
Dendrimer-acrylate 「V#1000」

STAR-501 : We let you accumulate DPHA (dipenthaerythiritol hexaacrylate) with a thiol material spherically and composed dendrimer-acrylate.

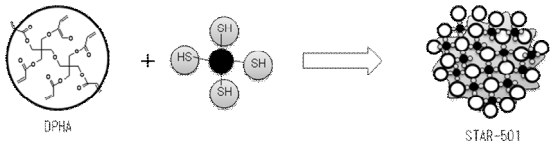

FIGURE.2
Dendrimer-acrylate 「STAR-501」

III. A RESULT OF UV-HARDENING OF STAR-501

In comparison with the linear polymer with molecular weight at the same level, it was confirmed that STAR-501 had low viscosity.

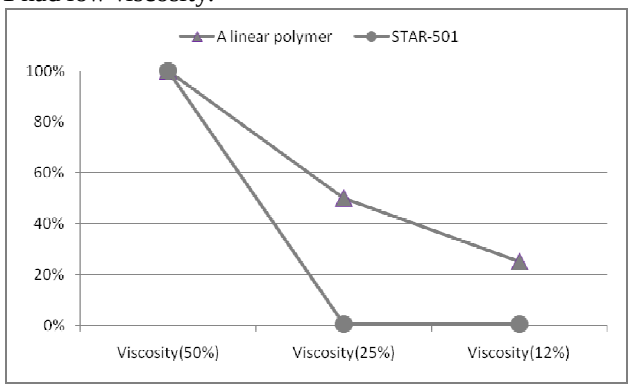

FIGURE 3.
Comparison of the viscosity behavior.

I combined a UVstart-agent with STAR-501 and DPHA, each and made the film of the same film thickness and exposed it and compared the disappearance speed of the double bond.

As a result, STAR-501 compared it with DPHA, and the increase of the cure rate was confirmed.

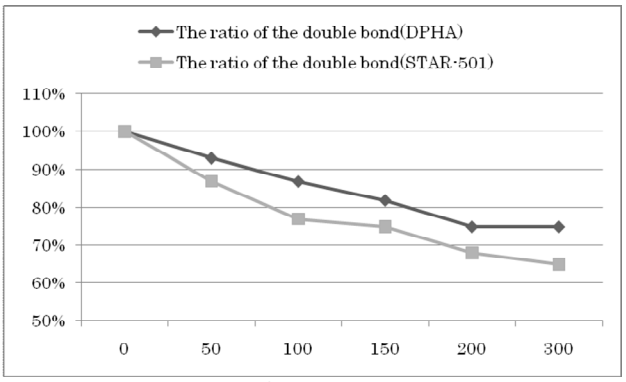

FIGURE 4.
The comparison of the cure rate.

With the point same as the measurement of the cure rate, I lowered the thickness of the application film and measured the exposure energy that was necessary for hardening. As a result, STAR-501 compared it with DPHA, and that even a thin film stiffened by little energy was confirmed. I understood that STAR-501 had little oxygen obstructions

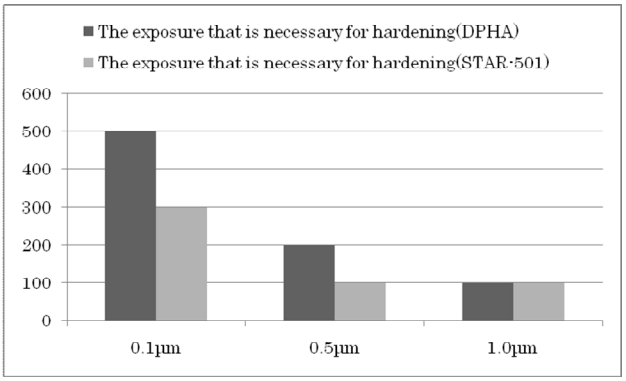

FIGURE 5.
The comparison of oxygen obstructions.

We performed the same film thickness, the pencil hardness (JIS) in the same polymerism degree and an adhesive examination (JIS). As a result, as for STAR-501, high coherency was identified as the hardness that was higher than DPHA.

		DPHA	STAR-501
Optics characteristic	Reflectance	5.9	6.0
	Transmittance	90	89
	Haze	0.8	0.8
Film characteristic	Pencil Hardness	2H	3H
	Adhesive	40/100	99/100
	Curl	NG	OK
	Steel wool Wonud(200g)	NG	OK

TABLE 2.
The pencil hardness and adhesive.

In V#1000 and STAR-501, I measured the volume shrinkage by the hardening. I made the volume shrinkage and the graph of the double bond chemical equivalent as comparison contrast in many sensuality monomer, two sensuality monomers, a single sensuality monomer (a molecular weight difference).

dendrimer-acrylate has a smaller hardening shrinkage than a normal acrylic monomer.

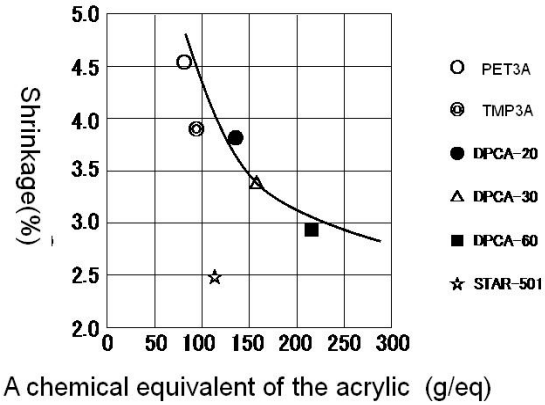

FIGURE 6.
The comparison of hardening shrinkage.

IV.CONCLUSIONS

Dendrimer-acrylate makes up for low hardening shrinkage, hardness and coexistence of the flexibility bad point of the conventional acrylic monomer.

REFERENCES

[1] WO2,008/047620