Nanoinprint is a processing technology which fabricates the nanoscopic concavo-convex structure on the resin surface by the fine patterned mold. The UV nanoinprint technology is the transfer printing technology. The spin coated UV curing resin is pressurized by the fine patterned mold, the ultraviolet light is irradiated, and the fine pattern of the mold is printed onto the UV curing resin surface.

In this study, with regard to the liquid ultraviolet curable resins of the three different amount of functional group equivalent, curing reaction rate, curing reaction heat, glass transition temperature, decomposition temperature, thermal expansion properties, and viscoelastic properties are analyzed by UV irradiation DSC, constant rate heating DSC, TGA, and DMA.

**Results and discussions**

**Photo Chemical Reaction Measurements**

![Photochemical Reaction DSC System](image)

The higher amount of functional group equivalent, the higher decomposition temperature of both uncured resin and cured resin becomes. In particular, as C-TGC-3 contains phenyl in main chain, the highest decomposition temperature is likely to be obtained.

**Glass Transition Temperature Measurements**

In case of same molecular structure polymer, the smaller the molecular weight, the lower the glass transition temperature becomes. Uncured resin, i.e. monomer, glass transition temperature is dependent on the amount of functional group equivalent. However as cured resin is already polymerized, the bigger the molecular weight by polymerization, the bigger the glass transition temperature difference might be.

**Conclusions**

Thermal analysis is very effective to the product evaluation of each nanoimprint process and enables the evaluation of volatility characteristics at coating, amount of heat and separation properties at transfer printing, hardness and thermal stability.

The smaller amount of functional group,
- The faster curing reaction rate, the stronger peak intensity and bigger peak area by photochemical DSC.
- The lower glass transition temperature (Tg) in uncured resin. However cured resins almost same Tg by DSC
- The lower decomposition temperature both uncured and cured by TGI/DTA
- The higher cross-link density sample cured by DMA.

**Decomposition Measurements**

![DTA and TGA](image)

**Viscoelasticity Measurements**

![DMA](image)

Real Time Photo-Curing Reaction Measurement and Thermal Properties of UV Curing Resin for Nanoimprint

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