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Title: Real Time Photo-Curing Reaction Measurement And Thermal Properties Of UV Curing Resin For Nanoimprint

Authors: Yuichi Kasai, SII Nanotechnology, In.
Nobuaki Okubo, SII NanoTechnology Inc.
Toshihiko Nakamura, SII Nanotechnology, In.

Abstract:

Nanoimprint is a processing technology which fabricates the nanoscopic concavo-convex structure on the resin surface by the fine patterned mold. In particular, the UV nanoimprint 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. It has the advantages that the resin does not have much thermal stress and less pressurization by the mold because the resin is cured instantly at the room temperature. However, with regard to the UV nanoimprint technology, there are few reports regarding the relationships between the molecular structure of the UV curing resin and the curing reaction behavior, and the molecular structure of the UV curing resin and the glass transition temperature. In this study, the curing reaction behavior and the thermal properties before and after curing is analyzed by the photochemical reaction DSC and TG/DTA. With regard to the three different types of the UV curing resins in the functional group equivalent amount, the analysis of dependencies of the reaction rate and the functional group equivalent amount, the reaction enthalpy and the functional group equivalent amount, and the glass transition temperature and the functional group equivalent amount results in the tendency that the smaller functional group equivalent amount, the faster the reaction rate and the bigger reaction enthalpy it has. It has a tendency that the smaller the functional group equivalent amount of the uncured resins, the lower the glass transition temperature is. However after curing, the glass transition temperatures of the three resins become almost the same, i.e. glass transition temperature of cured resins has no dependency on the functional group equivalent amount.