Contribution ID: **147** Type: **Poster**

Thermal analysis of dual cure epoxy adhesive with very small dot size at extremely low and high heating temperature

Thermal analysis was used to study epoxy crosslink occurring during the curing process by observing lower thermal energy amount required for phase change which can be determined by differential scanning calorimetry (DSC). Dual cured epoxy adhesive was done by firstly UV light exposure then heat at about transition temperature. The DSC results indicated that epoxy adhesive exhibited curing reaction with exothermic peak at around 120 ℃ and decomposing endothermic peak at about 270 ℃. In this work, the thermal analysis was examined at both temperature edges of this exothermic peak i.e. at 90 ℃ and 150 ℃. The curing processes at these extreme temperatures both very relative low and high temperatures can enable different feature dependenceof the curing process. The DSC peak area for heat cure at 120 ℃ indicates exponential decrease and is needed more curing time than that of only UV cure. However the degree of cure for heating at low temperature curing of 90 ℃ indicated linearly increase. For dual cure with initial exposure by 0.71 W/cm2 of UV light for 0.3 sec, heating time at temperatures of 90 ℃ and 120 ℃ can be reduced from single curing process of 40 to 6 minutes and 1 to 0.5 minutes, respectively. While the high temperature cure at 150 ℃ exhibit very much faster curing process approximately few minutes.

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Track Classification: Nano-characterization & instruments