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LCE/DABP계의 경화반응속도론
(Cure Reaction Kinetics of LCE/DABP System)

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Liquid crystalline thermosets(LCT) are gradually applied for high performance parts in the electric/electronic, aerospace, automobile field because of their high thermal stability, mechanical strength, high heat resistance, low coefficient of thermal expansion and dimensional stability.

In this study, thermal properties of new synthesized LC epoxy resin were observed. The curing agent was 4,4'-diaminobiphenyl(DABP). Thermal analysis of the mixture LCE/DABP(1:1, 2:1 and 3:2) was performed using a DSC(differential scanning calorimeter) under a dynamic condition. Around 3-4 mg of well-mixed sample was placed in aluminum pan and cured at heating rate 3, 5, 10 and 20℃/min, respectively. Purge gas was nitrogen and it's flow rate was at 50 ml/min. Synthesized LC epoxy resin showed high T_g(glass transition temperature) and E_a(activation energy) due to the high bonding strength among molecules. The kinetic parameters for the LCE/DABP system were investigated using the following Kissinger equation:

$$-\ln\left(\frac{q}{T_p^2}\right)=\frac{E_a}{R}\frac{1}{T_p}-\ln\left(\frac{AR}{E_a}\right)$$

where, q the heating rate, T_p the temperature at which maximum cure rate took place on the DSC curves, E_a the activation energy of curing, R the gas constant, and A the pre-exponential factor. From the relationship between $-\ln(q/T_p^2)$ and $1/T\times10^3$, activation energy and pre-exponential factor could be calculated by using the slope and y-intersect, respectively.

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