

Supplementary Data

Preparation and Research of Epoxy Modified by Carboxyl-Terminated Polybutylene Adipate at Room Temperature

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Table S1. Effect of modification methods on properties of modified epoxy resin

| Modification Methods | Contents (phr) | Tensile | T peel | Tensile | Elongati | Impact |
|----------------------|----------------|----------------------|-----------------|----------------|-----------------|-------------------------------|
| | | shear strength (MPa) | strength (kN/m) | strength (MPa) | on at break (%) | strength (kJ/m ²) |
| E-51 | 0 | 9.61 | 0.02 | 35.85 | 4.49 | 2.92 |
| Method 1 | 20 | 11.03 | 0.14 | 16.27 | 26.68 | 4.15 |
| | 40 | 10.14 | 0.32 | 12.24 | 50.40 | 12.40 |
| | 60 | 2.92 | 1.40 | 2.74 | 85.19 | 5.75 |
| Method 2 | 20 | 6.01 | 0.16 | 17.84 | 36.01 | 3.31 |
| | 40 | 1.74 | 1.20 | 2.34 | 78.70 | 1.37 |
| | 60 | 0.71 | 0.44 | 0.46 | 85.15 | 1.06 |
| Method 3 | 20 | 11.35 | 0.08 | 30.66 | 22.21 | 3.71 |
| | 40 | 11.44 | 0.16 | 20.19 | 48.21 | 6.98 |
| | 60 | 8.94 | 0.20 | 7.01 | 70.71 | 3.57 |

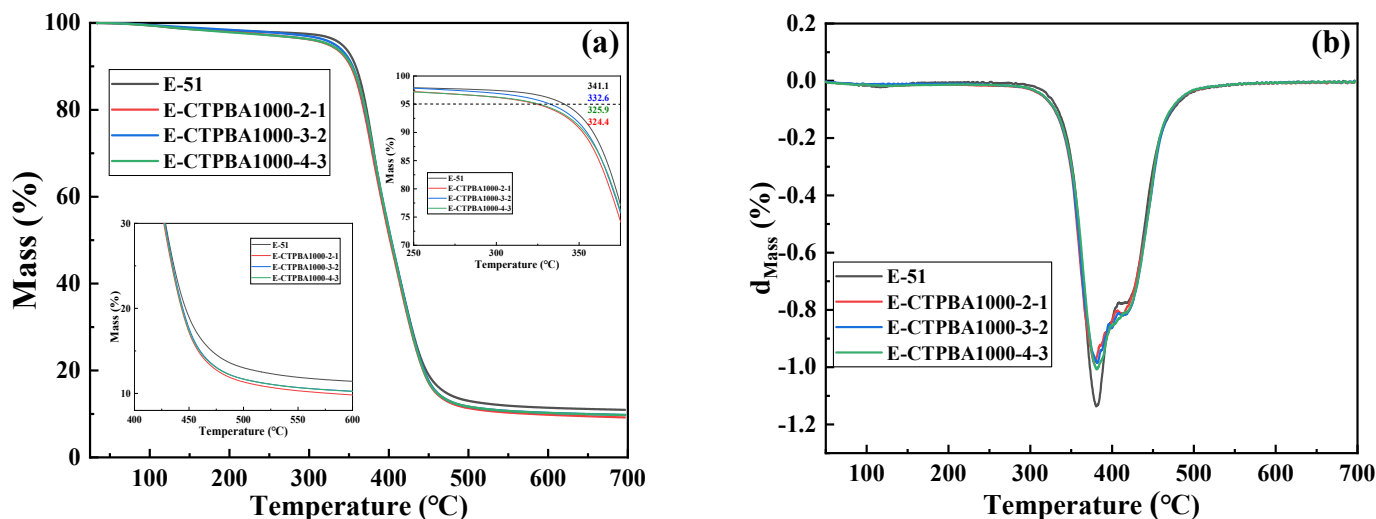


Figure S1. Effect of CTPBA1000 and E-51 with different proportions on (a) TG and (b) DTG

Table S2. Effect of different proportions of CTPBA1000 and E-51 on thermal stability

| | Temperature(°C) under different weight loss | | | | | |
|-----------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|
| | T ₅ | T ₁₀ | T ₁₅ | T ₃₀ | T ₄₀ | T ₅₀ |
| E-51 | 341.09 | 358.44 | 366.48 | 381.46 | 390.80 | 402.47 |
| E-CTPBA1000-2-1 | 324.39 | 352.07 | 361.96 | 379.29 | 389.96 | 401.50 |
| E-CTPBA1000-3-2 | 332.59 | 354.64 | 363.86 | 380.99 | 391.48 | 403.17 |
| E-CTPBA1000-4-3 | 325.85 | 353.47 | 363.88 | 381.20 | 391.34 | 402.87 |

*T_n is the temperature of weight loss n %

Generally, the temperature corresponding to the thermal weight loss of 5 % is taken as the initial temperature of the thermal weight loss, and the thermal stability of the cured product is usually evaluated by the weight loss temperature T_d of 5 %, 15 % and 50 %. As shown in Fig. 4, thermogravimetric curves of epoxy resin modified with different molar ratios after curing were shown. It can be seen that there was only one decomposition step in the range of 25~700 °C. From the DTG curve, it can be seen that after the addition of E-CTPBA1000, the maximum thermal decomposition rate was smaller than that of pure epoxy system, and the corresponding thermal decomposition temperature was not significantly different. By analyzing the initial temperature T₅ of TGA, it can be seen that the T₅ of epoxy resin adhesive modified with carboxyl-terminated polyester was lower than that of pure epoxy system, which may be due to the decomposition of internal polyester, and the initial thermal decomposition temperature of E-CTPBA1000-3-2. Overall, different proportions of modified epoxy resin adhesive thermal stability difference was not big.

Table S3 Effect of E-CTPBA1000 additions on thermal stability

| Sample | Temperature(°C) under different weight loss | | | | | |
|-------------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|
| | T ₅ | T ₁₀ | T ₁₅ | T ₃₀ | T ₄₀ | T ₅₀ |
| E-PBA1000-2-1-0 | 341.09 | 358.44 | 366.48 | 381.46 | 390.80 | 402.47 |
| E-PBA1000-2-1-20 | 324.39 | 352.07 | 361.96 | 379.29 | 389.96 | 401.50 |
| E-PBA1000-2-1-40 | 328.50 | 352.77 | 362.86 | 380.9798 | 391.65 | 402.83 |
| E-PBA1000-2-1-60 | 329.30 | 354.73 | 365.12 | 383.74 | 394.89 | 406.45 |
| E-PBA1000-2-1-80 | 328.53 | 354.79 | 365.85 | 385.48 | 396.99 | 408.53 |
| E-PBA1000-2-1-100 | 329.37 | 354.41 | 365.46 | 385.14 | 396.31 | 407.18 |

*T_n is the temperature of weight loss n %