

## Supporting Information

### Synthesis of a diamine cross-linker containing Diels-Alder adducts to produce self-healing thermosetting epoxy polymer from a widely-used epoxy monomer

Nan Bai,<sup>a</sup> Kei Saito<sup>\*b</sup> and George P. Simon<sup>\*a</sup>

<sup>a</sup> Department of Materials Engineering, Monash University, Clayton, VIC 3800, Australia. Fax: 0399054934; Tel: 039905 4936; E-mail: george.simon@monash.edu

<sup>b</sup> Centre for Green Chemistry, Monash University, Clayton, VIC 3800, Australia. Fax: 0399058501; Tel: 0399054600; E-mail: kei.saito@monash.edu

#### Preparation of the cross-linked epoxy polymer without DA adducts (using Ethacure 100 diamine)

Ethacure 100 diamine (80% 3,5-diethyl-2,4-toluenediamine and 20% 3,5-diethyl-2,6-toluenediamine) (0.048 g, 0.27 mmol) and DGEBA (0.2 g, 0.54 mmol) were mixed directly and degased under vacuum (0.5 mm Hg) for 3 hours to achieve stoichiometry. After that, the mixture was heated at 60°C for 10 hours and then heated at 140°C for 2 hours to get the cross-linked epoxy polymer without DA adducts. FTIR  $\nu$  ( $\text{cm}^{-1}$ ) 3375, 2962, 2928, 2870, 1607, 1507, 1459, 1231, 1180, 1033, 826. Peak-fitting software (Igor Pro 6.2) was used to calculate the curing percentage by comparing the height of the epoxide group peak at  $4532 \text{ cm}^{-1}$  to that of original uncured mixture, normalised by the internal standard, and the resultant cure was 82.4%.

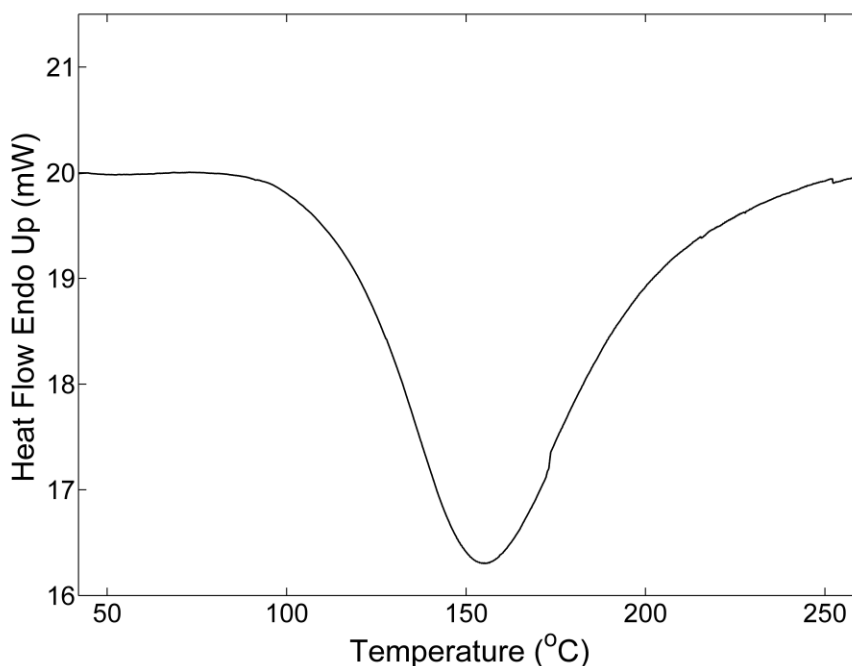
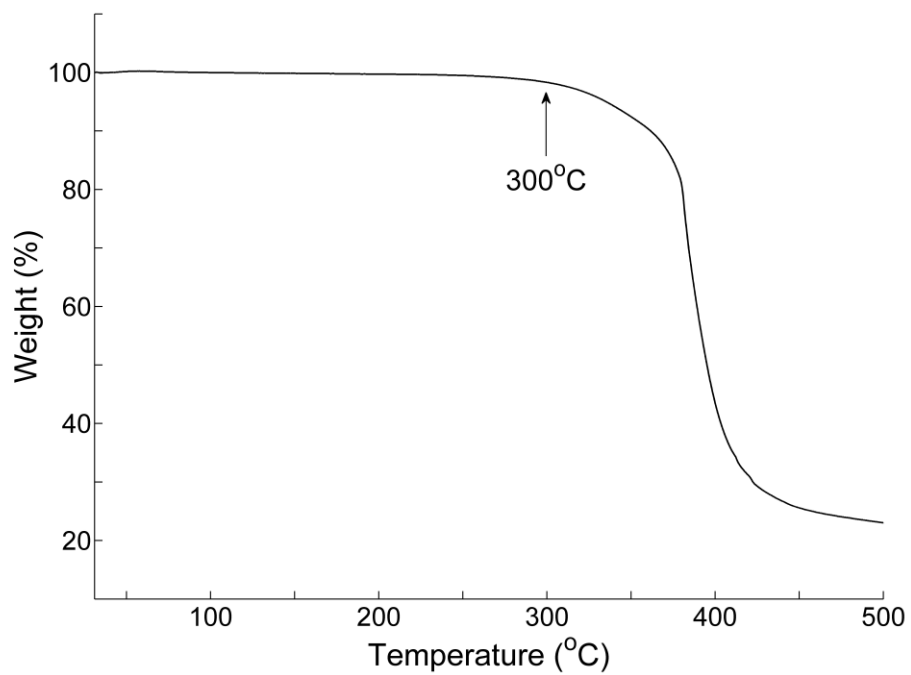
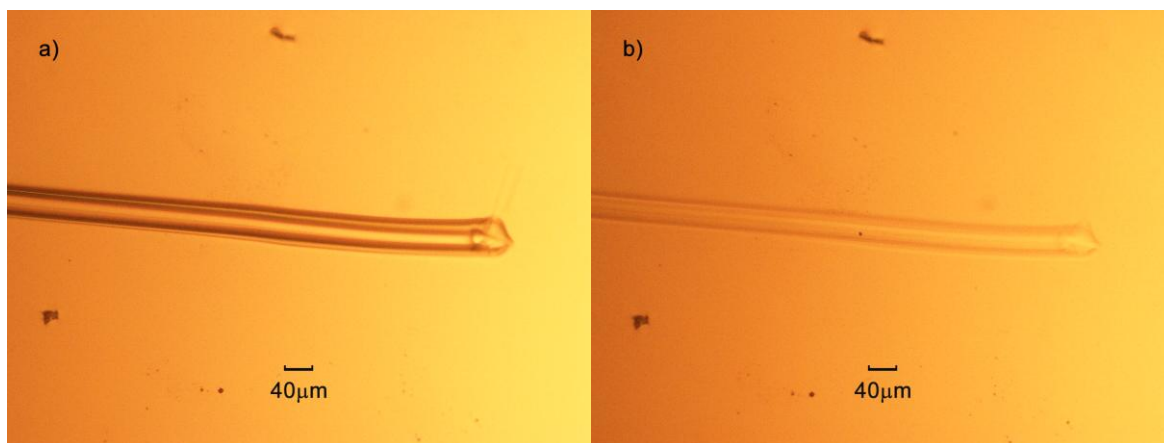


Figure S1 DSC result of a mixture of DGEBA monomer and Ethacure 100 diamine. Heating rate is 2°C/min.



**Figure S2** TGA result of cross-linked epoxy polymer without DA adducts (Ethacure 100 diamine cross-linker)



**Figure S3** Photos of epoxy polymer cross-linked with Ethacure 100 diamine (no DA adducts)

(a) scratches made on the surface, (b) sample after heating at 140°C for 30 minutes.