Supporting Information

Preparation of environment-friendly solid epoxy resin with high-toughness via one-step banburying

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Fig. S1. The SEM micrographs of impact fracture surface of R-EM10.
**Fig. S2.** DSC curves of epoxy systems with heat rates of 5, 10, 15, 20, 25 K min$^{-1}$: EVA-g-MAH addition amount of (a) 0 wt%, (b) 5 wt%, (c) 8 wt %, (d) 10 wt %, (e) 12 wt %, (f) 15 wt % and (g) 20 wt %, respectively.
Fig. S3. T-β diagram of epoxy systems with different content EVA-g-MAH: (a) 0 wt%, (b) 5 wt%, (c) 8 wt%, (d) 10 wt%, (e) 12 wt%, (f) 15 wt% and (g) 20 wt%, respectively.
Table S1. DSC curing data of modified epoxy systems with different content EVA-g-MAH

| Systems       | $\beta$ (K min$^{-1}$) | $T_i$(K) | $T_p$(K) | $T_f$(K) | $\Delta H$ (J g$^{-1}$) |
|---------------|------------------------|----------|----------|----------|------------------------|
| Neat EP       | 5                      | 382.93   | 410.97   | 436.36   | 96.60                  |
|               | 10                     | 391.24   | 424.87   | 445.80   | 100.00                 |
|               | 15                     | 402.09   | 433.71   | 457.61   | 103.20                 |
|               | 20                     | 407.51   | 439.22   | 466.47   | 82.79                  |
|               | 25                     | 408.75   | 443.09   | 471.47   | 118.6                  |
| R-EM5         | 5                      | 382.84   | 411.6    | 438.80   | 65.88                  |
|               | 10                     | 390.26   | 426.97   | 453.26   | 84.62                  |
|               | 15                     | 395.02   | 432.35   | 460.89   | 90.26                  |
|               | 20                     | 400.07   | 438.45   | 464.75   | 77.35                  |
|               | 25                     | 404.46   | 442.05   | 470.60   | 95.05                  |
| R-EM8         | 5                      | 383.75   | 410.67   | 436.67   | 74.67                  |
|               | 10                     | 385.91   | 424.19   | 449.66   | 84.64                  |
|               | 15                     | 393.51   | 431.67   | 453.22   | 89.69                  |
|               | 20                     | 400.24   | 435.86   | 463.22   | 100.10                 |
|               | 25                     | 403.46   | 440.88   | 471.10   | 79.30                  |
| R-EM10        | 5                      | 385.14   | 412.72   | 439.14   | 63.14                  |
|               | 10                     | 386.63   | 427.52   | 462.18   | 92.75                  |
|               | 15                     | 395.86   | 431.77   | 463.81   | 73.34                  |
|               | 20                     | 398.15   | 438.63   | 470.08   | 107.97                 |
|               | 25                     | 401.57   | 442.22   | 475.00   | 70.59                  |
| R-EM12        | 5                      | 384.05   | 409.59   | 437.32   | 82.70                  |
|               | 10                     | 385.46   | 423.12   | 455.25   | 97.62                  |
|               | 15                     | 397.34   | 431.56   | 463.36   | 95.14                  |
|               | 20                     | 400.04   | 434.35   | 467.03   | 93.09                  |
|               | 25                     | 404.15   | 439.67   | 470.85   | 85.01                  |
| R-EM15        | 5                      | 386.05   | 410.71   | 438.95   | 64.56                  |
|               | 10                     | 393.21   | 424.61   | 451.84   | 65.16                  |
|               | 15                     | 396.37   | 432.07   | 467.24   | 78.88                  |
|               | 20                     | 400.32   | 436.18   | 470.1    | 65.37                  |
| Systems | 25 | 403.78 | 441.26 | 472.08 | 66.65 |
|---------|----|--------|--------|--------|-------|
| 5       | 386.82 | 409.84 | 435.92 | 50.55 |
| 10      | 392.35 | 420.89 | 445.34 | 57.44 |
| R-EM20  | 396.12 | 430.34 | 464.75 | 57.64 |
| 20      | 401.25 | 436.64 | 468.32 | 66.09 |
| 25      | 402.48 | 441.69 | 473.01 | 67.43 |

**Table S2.** Kinetic parameters of the curing reaction for epoxy systems with different content EVA-g-MAH

| Systems | Kissinger | Ozawa | n   |
|---------|-----------|-------|-----|
|         | $E_a$(KJ/mol) | $A$(s$^{-1}$) | $R^2$ | $E_a$(KJ/mol) | $R^2$ | n     |
| Neat EP | 67.8 | 9.81×10$^4$ | 0.997 | 71.2 | 0.998 | 0.9053 |
| R-EM5   | 73.0 | 4.50×10$^5$ | 0.985 | 76.1 | 0.988 | 0.9115 |
| R-EM8   | 73.9 | 6.54×10$^5$ | 0.995 | 77.0 | 0.996 | 0.9128 |
| R-EM10  | 76.0 | 1.10×10$^6$ | 0.982 | 79.4 | 0.985 | 0.9147 |
| R-EM12  | 73.5 | 6.02×10$^5$ | 0.987 | 76.5 | 0.989 | 0.9125 |
| R-EM15  | 73.2 | 5.11×10$^6$ | 0.994 | 76.3 | 0.995 | 0.9119 |
| R-EM20  | 67.9 | 1.14×10$^6$ | 0.992 | 71.2 | 0.994 | 0.9056 |

**Table S3.** Gelation, curing and post-treatment temperature of epoxy systems with different content EVA-g-MAH

| Systems | $T_{gel}$(K) | $T_{cure}$(K) | $T_{treat}$(K) |
|---------|--------------|---------------|----------------|
| Neat EP | 378.1        | 406.8         | 428.3          |
| R-EM5   | 378.6        | 408.6         | 435.1          |
| R-EM8   | 377.2        | 407.0         | 430.0          |
| R-EM10  | 380.2        | 409.5         | 438.2          |
| R-EM12  | 377.8        | 406.2         | 435.1          |
| R-EM15  | 383.2        | 407.2         | 434.7          |
| R-EM20  | 383.7        | 404.0         | 428.3          |
Table S4. DMA parameters of epoxy systems with different content EVA-g-MAH

| Systems  | T<sub>Tg</sub>(°C) | E’ at T<sub>Tg</sub> +30 °C (MPa) | ν<sub>e</sub> (×10<sup>3</sup> mol/m<sup>3</sup>) |
|----------|---------------------|-------------------------------|-----------------|
| Neat EP  | 111.09              | 1.68                          | 0.163           |
| R-EM5    | 113.45              | 3.51                          | 0.338           |
| R-EM8    | 112.66              | 3.62                          | 0.349           |
| R-EM10   | 111.48              | 1.95                          | 0.189           |
| R-EM12   | 110.10              | 2.76                          | 0.268           |
| R-EM15   | 112.52              | 6.00                          | 0.579           |
| R-EM20   | 114.24              | 4.44                          | 0.426           |

Table S5. Characteristic parameters of the neat epoxy and EVA-g-MAH modified epoxy systems from the thermogravimetric plots.

| Systems  | T<sub>5%</sub> (°C) | T<sub>max</sub> (°C) | Char yield at 800 °C (%) |
|----------|---------------------|---------------------|--------------------------|
| Neat EP  | 368.1               | 444.1               | 1.5                      |
| R-EM5    | 365.6               | 445.6               | 0.4                      |
| R-EM8    | 372.2               | 446.3               | 4.0                      |
| R-EM10   | 380.7               | 449.1               | 8.5                      |
| R-EM12   | 378.4               | 445.9               | 6.5                      |
| R-EM15   | 375.8               | 447.1               | 7.7                      |
| R-EM20   | 376.9               | 449.5               | 6.4                      |