

Supporting Information

Environment-friendly Synthesis and Performance of a Novel Hyperbranched Epoxy Resin with Silicone Skeleton

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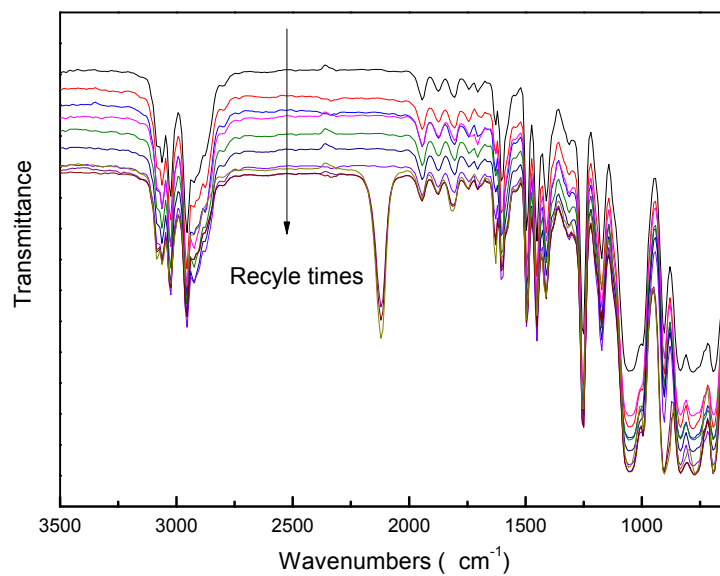


Figure S1. Relationship between recycled times of the halloysite-supported platinum catalyst and FT-IR spectra of the product.

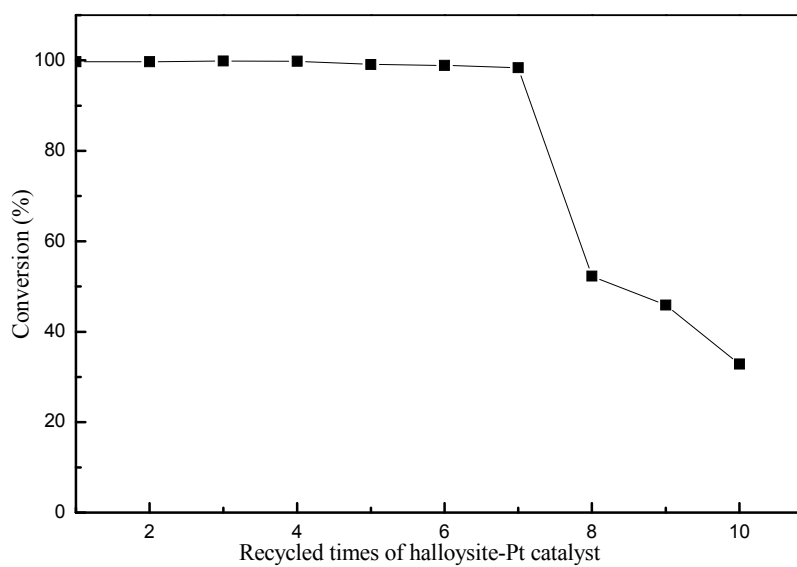


Figure S2. Relationship between conversion of Si-H bond and recycled times of the halloysite-supported platinum catalyst.

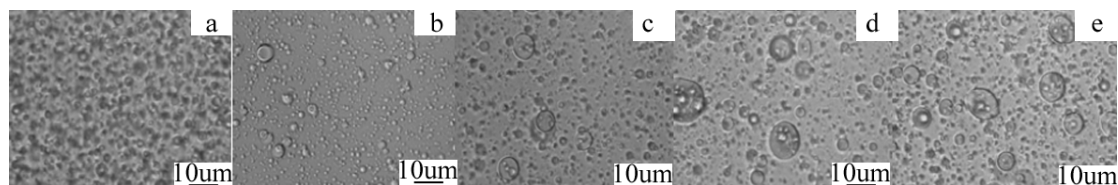


Figure S3. OM micrographs of 9wt%HERSS/91wt%DGEBA on the surface of glass slide with curing time: (a) 0 min, (b) 5min, (c) 10min, (d) 30min and (e) 60min.

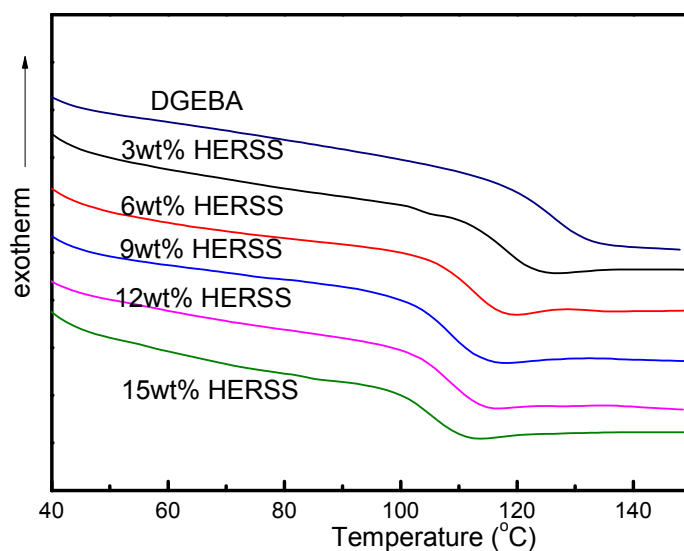


Figure S4. DSC curves of HERSS/DGEBA composites and DGEBA.

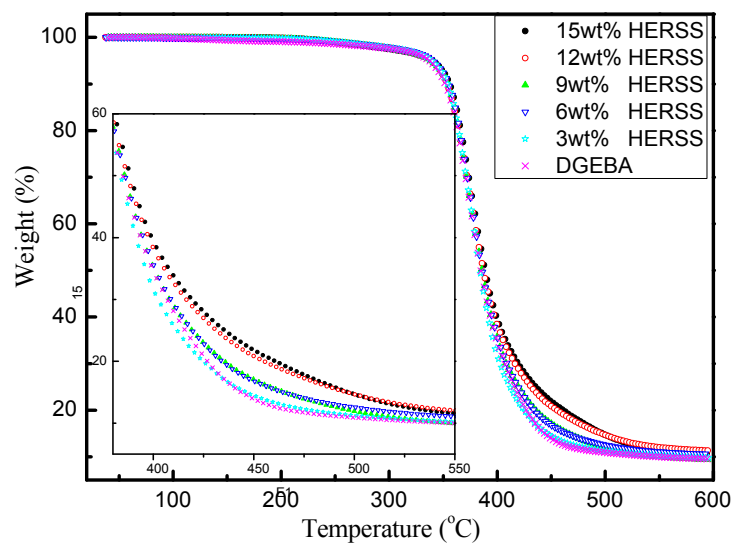


Figure S5. TGA curves of HERSS/DGEBA composites and DGEBA.

Table S1. TGA data of HERSS/DGEBA composites and DGEBA.

Typical data	<i>T_i</i> (Temp.5% weight loss) (°C)	Temp.10% weight loss(°C)	Temp. Max. Degrad. Rate (°C)
DGEBA-DETA-AN	337.5	352.1	378.4
3wt% HERSS /DGEBA-DETA-AN	339.4	354.0	379.6
6wt% HERSS /DGEBA-DETA-AN	340.5	355.1	375.6
9wt% HERSS /DGEBA-DETA-AN	340.2	354.6	376.5
12wt% HERSS /DGEBA-DETA-AN	339.6	353.8	375.2
15wt% HERSS /DGEBA-DETA-AN	340.1	356.0	373.6
DGEBA-MNA	99.1	306.7	368.6
HERSS-MNA	380.0	401.0	468.5

S1. FT-IR data of TMDS, AGE, TDPGE, PTAS, AHRSS and HERSS.

Characteristic bonds of TMDS in FT-IR (KCl, cm^{-1}): 2955 (s, CH_3), 2121 (s, Si-H), 1254 (s, Si-C), 1052 (s, Si-O-Si). AGE (KCl, cm^{-1}): 3059 (s, =C-H), 1646 (s, CH=CH₂), 1250 (s, C-O-C), 912 (s, epoxy group). TDPGE (KCl, cm^{-1}): 2121 (s, Si-H), 1254 (s, C-O-C), 912 (s, epoxy group). PTAS (KCl, cm^{-1}): 3060 (s, =C-H), 1629 (s, CH=CH₂). AHRSS (KCl, cm^{-1}): 3060 (s, =C-H), 1629 (s, CH=CH₂). HERSS (KCl, cm^{-1}): 1250 (s, C-O-C), 905 (s, epoxy group).

S2. ¹H NMR data of TDPGE, PTAS, AHRSS and HERSS.

PTAS (¹H NMR, CDCl_3 , ppm): δ 1.89-1.91 (c, 2H), 4.91-4.98 (a, 2H), 5.78-5.89

(b, 1H), 7.39-7.56 (d, 5H). TDPGE (^1H NMR, CDCl_3 , ppm): δ 4.63-4.75 (n, 1H), 3.63-3.77 (j_1 , 1H), 3.41-3.45 (i, 2H), 3.35-3.41 (j_2 , 1H), 3.05-3.14 (k, 1H), 2.73-2.83 (m_1 , 1H), 2.53-2.63 (m_2 , 1H), 1.51-1.65 (h, 2H), 0.48-0.59 (g, 2H), 0.04-0.25 (e, f, 12H). AHRSS (^1H NMR, CDCl_3 , ppm): δ 7.22-7.62 (d, 5H), 5.66-5.93 (b, 1H), 4.68-5.05 (a, 2H), 1.74-2.00 (c, 2H), 1.31-1.57 (p, 2H), 0.81-1.09 (r, 2H), 0.43-0.81 (t, 2H). HERSS (^1H NMR, CDCl_3 , ppm): δ 7.23-7.57 (d, 5H), 3.65-3.80 (j_1 , 1H), 3.43-3.58 (i, 2H), 3.32-3.43 (j_2 , 1H), 3.08-3.21 (k, 1H), 2.73-2.84 (m_1 , 1H), 2.53-2.64 (m_2 , 1H), 1.54-1.73 (h, 2H), 1.27-1.48 (p, 2H), 0.82-0.95 (r, 2H), 0.55-0.71 (t, 2H), 0.46-0.55 (g, 2H).

S3. ^{13}C NMR data of TDPGE, PTAS, AHRSS and HERSS.

PTAS (100 MHz ^{13}C NMR, CDCl_3 , ppm): δ 134.03-134.19 (d, C), 133.06-133.23 (e, C), 132.60-132.89 (b, C), 128.08-128.40 (g, C), 126.36-126.95 (f, C), 112.91-113.52 (a, C), 18.30-18.68 (c, C), 76.8-77.5 (CDCl_3 , C). TDPGE (100 MHz ^{13}C NMR, CDCl_3 , ppm): δ 74.42-74.71 (i, C), 71.71-71.94 (k, C), 50.94-51.26 (m, C), 44.16-44.55 (p, C), 23.65-23.99 (j, C), 13.25-15.32 (i, C), 0.21-1.25 (h, C), 76.8-77.5 (CDCl_3 , C). AHRSS (100 MHz ^{13}C NMR, CDCl_3 , ppm): δ 134.74-135.19 (d, C), 134.21-134.68 (e, C), 133.75-134.15 (b, C), 128.79-129.75 (g, C), 127.52-128.40 (f, C), 112.86-115.62 (a, C), 19.53-21.03 (c, C), 17.56-18.28 (r, C), 16.08-17.42 (q, C), 13.43-14.61 (t, C), 0.2-1.79 (h, C), 76.8-77.5 (CDCl_3 , C). HERSS (100 MHz ^{13}C NMR, CDCl_3 , ppm): δ 134.59-134.76 (d, C), 134.19-134.45 (e, C), 128.73-129.02 (g, C), 127.70-128.10 (f, C), 74.08-74.80 (i, C), 71.22-72.01 (k, C), 50.71-51.31 (m, C),

44.05-44.77 (p, C), 23.66-24.24 (j, C), 18.03-18.34 (r, C), 17.10-17.56 (q, C),
14.35-14.82 (t, i, C), 0.35-0.90 (h, C), 76.8-77.5 (CDCl₃, C).