

Supporting Information

Effect of Molecular Weight of Hyperbranched Epoxy Resins with Silicone

Skeleton on Performance

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Figure S3. FT-IR spectra of HERSS-1, HERSS-2, HERSS-3 and HERSS-4.

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Table S1. volume contents of the islands in all cured composites.

Table S2. TGA data of cured HERSS/DGEBA composites and DGEBA.

S1. FT-IR, ^1H NMR and ^{13}C NMR data of AHRSS.

S2. FT-IR, ^1H NMR and ^{13}C NMR data of HERSS.

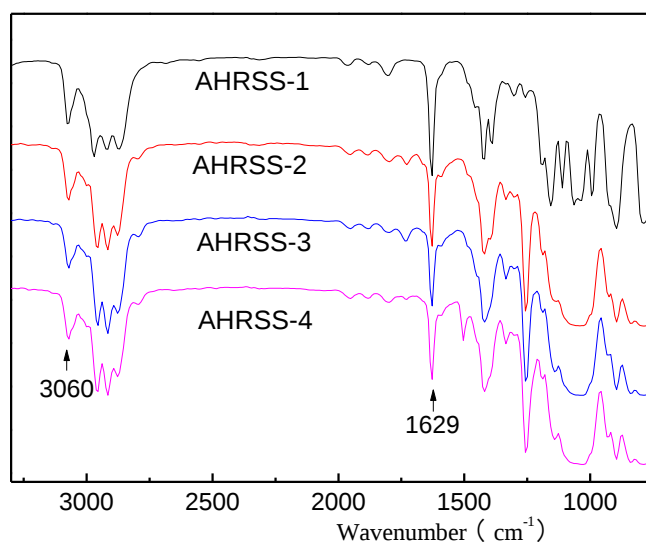


Figure S1. FT-IR spectra of AHRSS-1,AHRSS-2,AHRSS-3 and AHRSS-4.

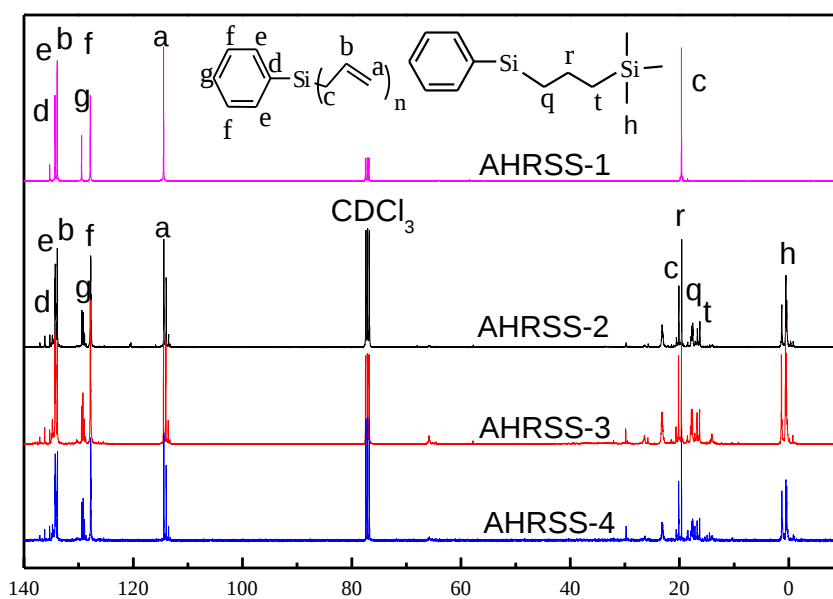


Figure S2. ^{13}C NMR spectra of AHRSS-1, AHRSS-2, AHRSS-3 and AHRSS-4.

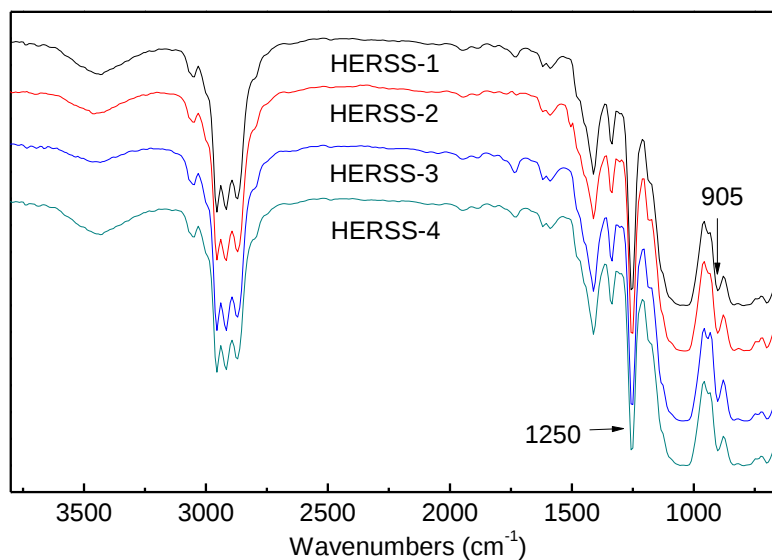


Figure S3. FT-IR spectra of HERSS-1, HERSS-2, HERSS-3 and HERSS-4.

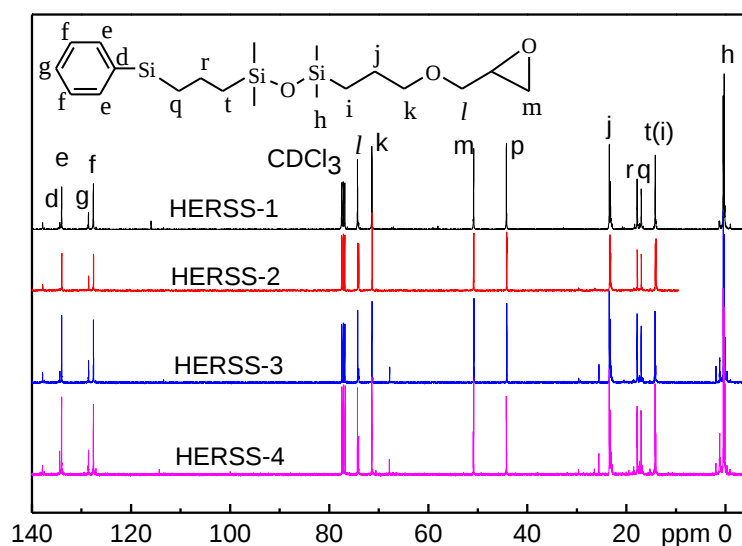


Figure S4. ¹³C NMR spectra of HERSS-1, HERSS-2, HERSS-3 and HERSS-4.

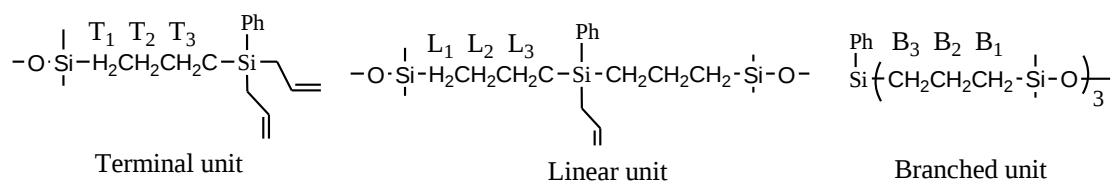


Figure S5. Chemical structures of terminal, linear and branched units.

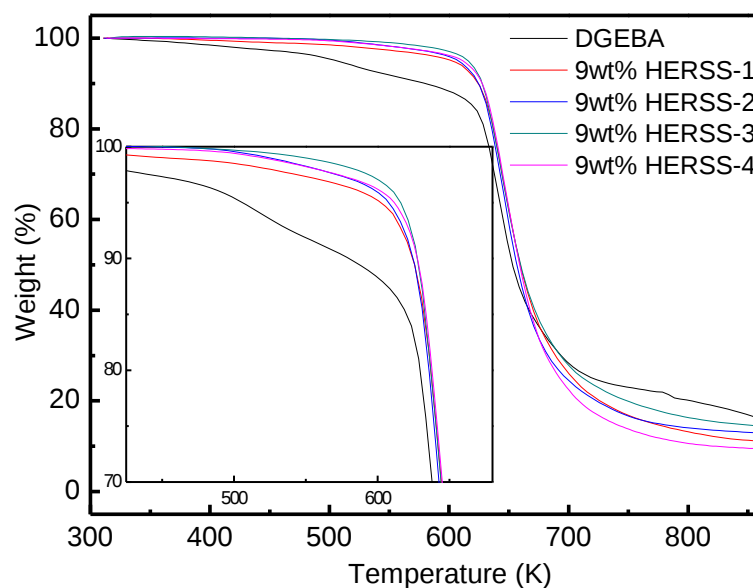


Figure S6. TGA curves of cured HERSS/DGEBA composites and DGEBA.

Table S1. volume contents of the islands in all cured composites.

Performance	volume calculated from SEM micrographs /%	volume calculated from theoretical formula /%
9wt% HERSS-1	3.73	8.39
9wt% HERSS-2	6.90	8.43
9wt% HERSS-3	8.52	8.52
9wt% HERSS-4	9.40	8.48

Table S2. TGA data of cured HERSS/DGEBA composites and DGEBA.

Typical data	Temp.5% weight loss (K)	Temp.10% weight loss (K)	Temp. max degrad. rate (K)
DGEBA	506.0	580.1	644.5
9wt% HERSS-1/DGEBA	602.4	624.3	645.1
9wt% HERSS-2/DGEBA	607.7	623.6	647.3
9wt% HERSS-3/DGEBA	614.2	626.6	647.5
9wt% HERSS-4/DGEBA	616.1	627.9	644.4

S1. FT-IR, ^1H NMR and ^{13}C NMR data of AHRSS.

Characteristic bonds of AHRSS in FT-IR (KCl, cm^{-1}) in Figure S1: 3060 (s, =C-H), 1629 (s, CH=CH₂).

AHRSS-1 (^1H NMR, CDCl₃, ppm) in Figure 2: 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). AHRSS-2, AHRSS-3 and AHRSS-4 (^1H NMR, CDCl₃, 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).

AHRSS-1 (100 MHz ^{13}C NMR, CDCl₃, ppm) in Figure S2: 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 (CDCl₃, C). AHRSS-2, AHRSS-3 and AHRSS-4 (100 MHz ^{13}C NMR, CDCl₃, 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 (CDCl₃, C).

S2. FT-IR, ^1H NMR and ^{13}C NMR data of HERSS.

HERSS (FT-IR, KCl, cm^{-1}) in Figure S3: 1250 (s, C-O-C), 905 (s, epoxy group). The diminishment of the peak at 3060 cm^{-1} and the disappearance of the peak at 1629 cm^{-1} (Figure 5) also suggest complete conversion of the double bond of AHRSS.

HERSS (^1H NMR, CDCl₃, ppm) in Figure 3: δ 7.23-7.57 (d, 5H), 3.65-3.80 (j₁, 1H), 3.43-3.58 (i, 2H), 3.32-3.43 (j₂, 1H), 3.08-3.21 (k, 1H), 2.73-2.84 (m₁, 1H), 2.53-2.64 (m₂, 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).

HERSS (100 MHz ^{13}C NMR, CDCl_3 , ppm) in Figure S4: 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 (CDCl_3 , C).