Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Enhanced thermal stability and lifetime of epoxy nanocomposites using covalently functionalized clay: Experimental and modelling

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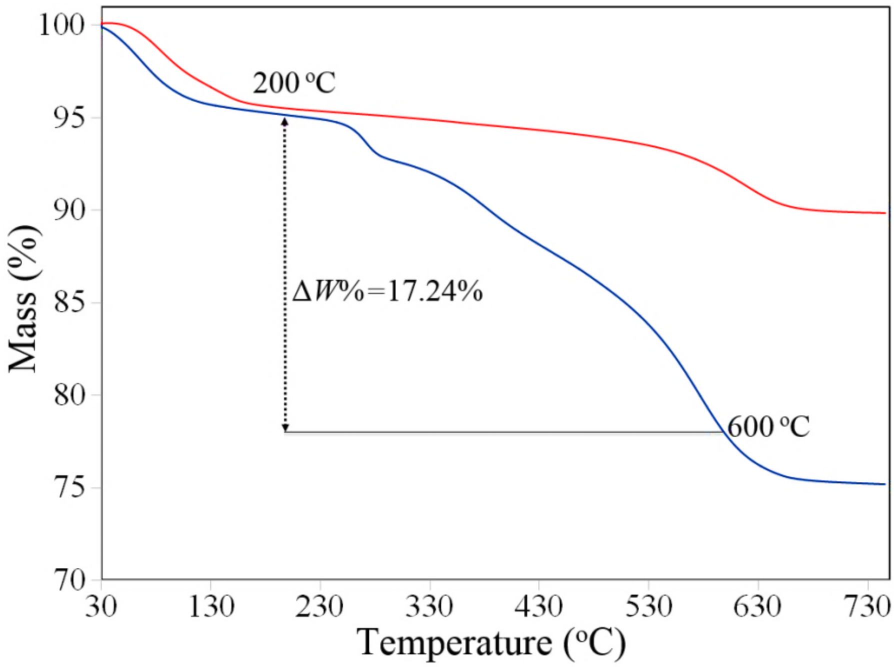


Fig. S1. TGA curves of pristine clay (top) and s-clay (bottom) at heating rate 10 °C/min.

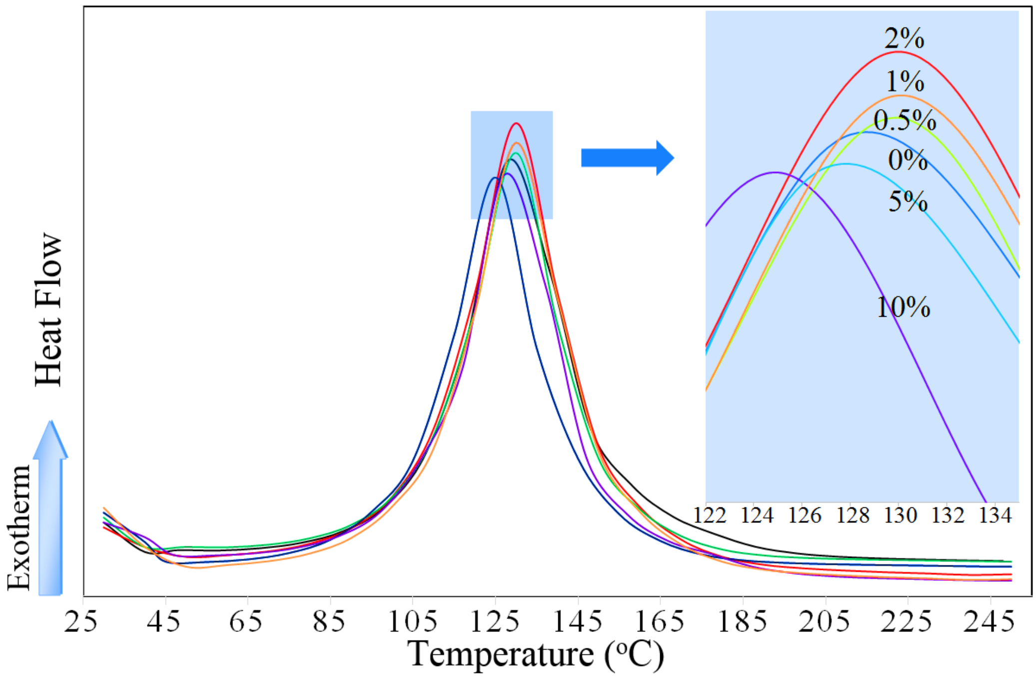


Fig. S2. DSC measurements on curing of epoxy nanocomposites in present of various concentrations of s-clay.

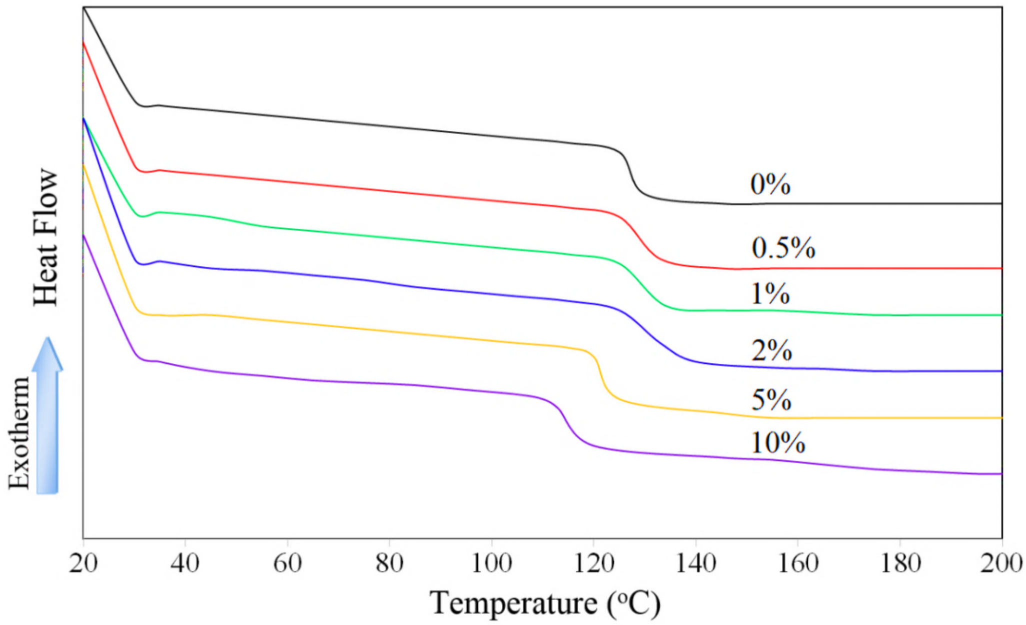


Fig. S3. DSC measurements on cured epoxy nanocomposites containing various concentrations of s-clay for determination of T_g.

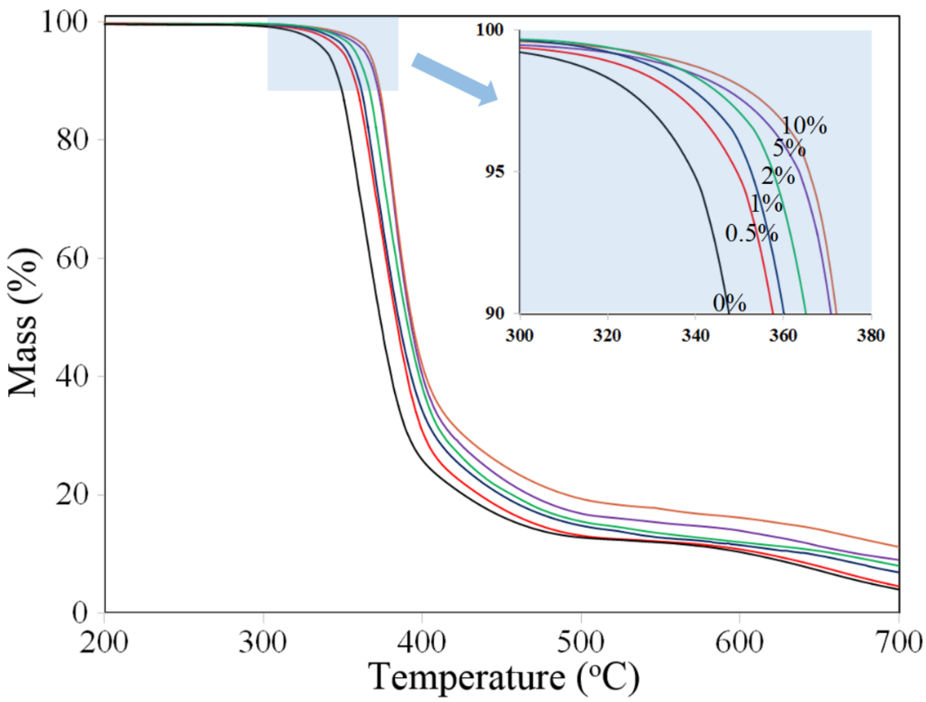
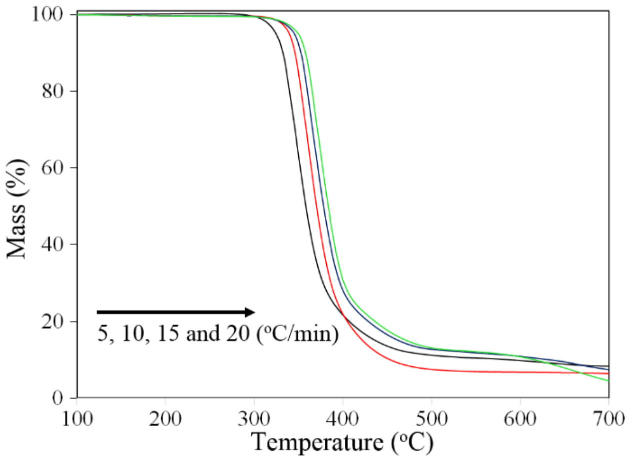
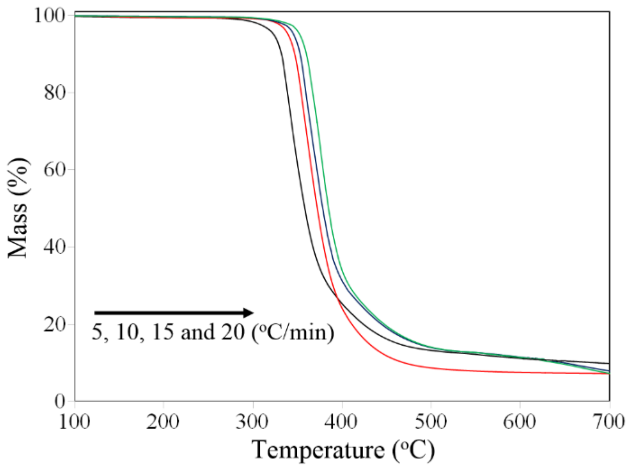


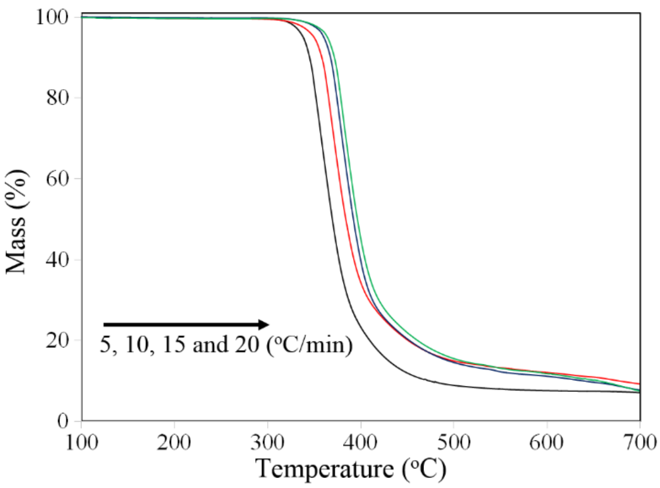
Fig. S4. TGA curves of epoxy nanocomposites containing various concentrations of s-clay.



(a)



(b)



(c)

Fig. S5. TGA curves of the pure epoxy (a), epoxy/o-clay (b), and epoxy/s-clay (c) systems recorded at different heating rates.

Table S1. Algebraic expressions for *f(α)* and *g(α)* for the most frequently used mechanisms of solid state processes.

Symbol	***f(α)***	***g(α)***	**Solid state processes**
A_2	$2(1-\alpha)[-\ln(1-\alpha)]^{1/2}$	$[-\ln(1-\alpha)]^{1/2}$	Nucleation and growth (Avrami equation 1)
A_3	$3(1-\alpha)[-\ln(1-\alpha)]^{2/3}$	$[-\ln(1-\alpha)]^{1/3}$	Nucleation and growth (Avrami equation 2)
A_4	$4(1-\alpha)[-\ln(1-\alpha)]^{3/4}$	$[-\ln(1-\alpha)]^{1/4}$	Nucleation and growth (Avrami equation 3)
R_1	1	α	Phase boundary controlled reaction (one-dimensional movement)
R_2	$2(1-\alpha)^{1/2}$	$[1-(1-\alpha)^{1/2}]$	Phase boundary controlled reaction (Contracting area)
R_3	$3(1-\alpha)^{2/3}$	$[1-(1-\alpha)^{1/3}]$	Phase boundary controlled reaction (Contracting volume)
D_1	$1/2\alpha$	α^2	One-dimensional diffusion
D_2	$[-\ln(1-\alpha)]^{-1}$	$(1-\alpha)\ln(1-\alpha)+\alpha$	Two-dimensional diffusion
D_3	$3/2(1-\alpha)^{3/2}[1-(1-\alpha)^{1/3}]$	$[1-(1-\alpha)^{1/3}]^2$	Three-dimensional diffusion (Jander equation)
F_1	$(1-\alpha)$	$-\ln(1-\alpha)$	Random nucleation with one nucleus on the individual particle
F_2	$(1-\alpha)^2$	$[1/(1-\alpha)]-1$	Random nucleation with two nuclei on the individual particle
F_3	$(1-\alpha)^3$	$[-1+(1-\alpha)^{-2}]$	Random nucleation with three nuclei on the individual particle

Table S2. Activation energies obtained as a function of conversion during thermal degradation of the pure epoxy (a), epoxy/o-clay (b), and epoxy/s-clay (c) systems using the advanced isoconversional method.

Conversion	**E_a (kJ mol^{-1}) (a)**	**E_a (kJ mol^{-1}) (b)**	**E_a (kJ mol^{-1}) (c)**
0.05	134.2	133.5	135.4
0.10	135.5	136.4	136.2
0.15	135.7	137.7	138.3
0.20	136.3	139.1	140.4
0.25	137.1	142.3	151.7
0.30	138.0	152.2	173.5
0.35	141.6	161.1	191.2
0.40	142.5	176.2	212.3
0.45	143.3	191.7	225.0
0.50	144.3	194.5	236.4
0.55	145.1	192.8	237.0
0.60	146.6	182.3	234.8
0.65	147.4	173.2	221.7
0.70	148.0	166.5	211.6
0.75	150.9	158.0	202.6
0.80	151.4	157.7	196.8
0.85	152.7	156.8	193.7
0.90	152.2	155.2	184.3
0.95	153.4	154.1	186.8