
Article

Advancing Thermoset Technology: 4R Materials with Unchanged Mechanical Properties and Enhanced Sustainability Through Repellency, Recyclability, Reprocessability, and Repairability

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Table S1. Formulations prepared using the MA2000 PDMS

Sample	Epikote (g)	Epoxy eq.	PDMS (%wt)	MA2000 (g)	Amine eq.		4-AFD (g)
					MA2000	4-AFD	
4R-01	10.5	0.06	0.2	0.021	$2.1 \cdot 10^{-05}$	$7.20 \cdot 10^{-02}$	4.469
4R-02	10.5	0.06	0.8	0.084	$8.4 \cdot 10^{-05}$	$7.19 \cdot 10^{-02}$	4.465

Table S2. Formulations prepared using the MA6000 PDMS.

Sample	Epikote (g)	Epoxy eq.	PDMS (%wt)	MA6000 (g)	Amine eq.		4-AFD (g)
					MA6000	4-AFD	
4R-03	10.5	0.06	0.2	0.021	$7 \cdot 10^{-06}$	$7.20 \cdot 10^{-02}$	4.470
4R-04	10.5	0.06	0.8	0.084	$2.8 \cdot 10^{-05}$	$7.20 \cdot 10^{-02}$	4.469

Table S3. Formulations prepared using the DA850 PDMS.

Sample	Epikote (g)	Epoxy eq.	PDMS (%wt)	DA850 (g)	Amine eq.		4-AFD (g)
					DA850	4-AFD	
4R-05	10.5	0.06	0.2	0.021	$1 \cdot 10^{-04}$	$7.19 \cdot 10^{-02}$	4.464
4R-06	10.5	0.06	0.8	0.084	$4 \cdot 10^{-04}$	$7.16 \cdot 10^{-02}$	4.446
4R-07	10.5	0.06	1.6	0.168	$8 \cdot 10^{-04}$	$7.12 \cdot 10^{-02}$	4.422
4R-08	10.5	0.06	3.2	0.336	$1.6 \cdot 10^{-03}$	$7.04 \cdot 10^{-02}$	4.372

Table S4. Formulations prepared using the DA3000 PDMS.

Sample	Epikote (g)	Epoxy eq.	PDMS (%wt)	DA3000 (g)	Amine eq.		4-AFD (g)
					DA3000	4-AFD	
4R-09	10.5	0.06	0.2	0.021	$3 \cdot 10^{-05}$	$7.20 \cdot 10^{-02}$	4.469
4R-10	10.5	0.06	0.8	0.084	$1.1 \cdot 10^{-04}$	$7.19 \cdot 10^{-02}$	4.464
4R-11	10.5	0.06	1.6	0.168	$2.2 \cdot 10^{-04}$	$7.18 \cdot 10^{-02}$	4.457
4R-12	10.5	0.06	3.2	0.336	$4.5 \cdot 10^{-04}$	$7.16 \cdot 10^{-02}$	4.443

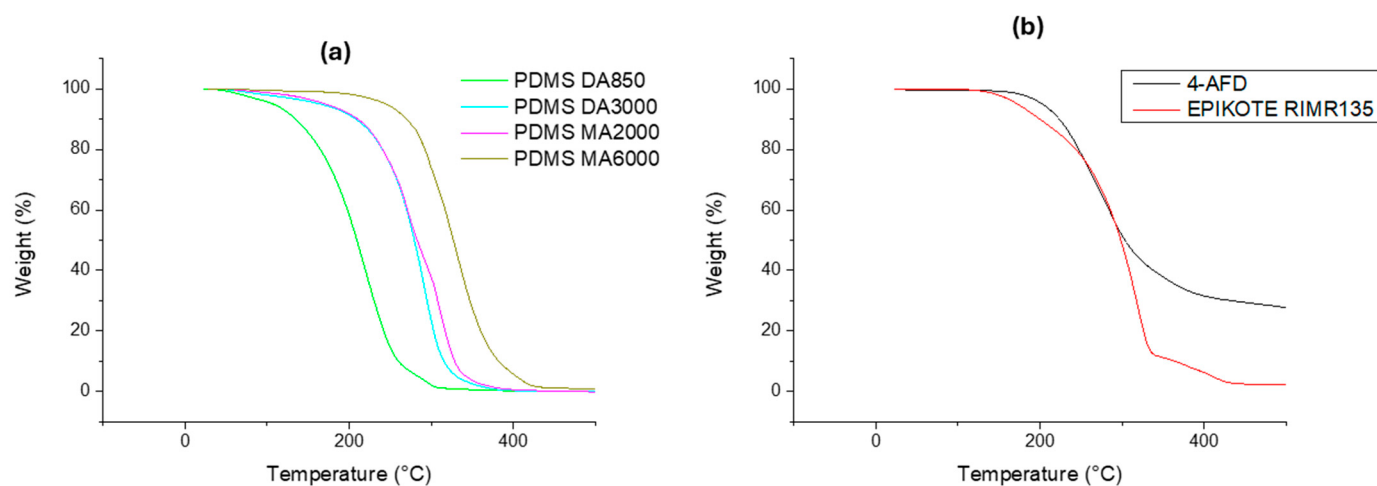


Figure S1. TGA curves of the reactants used in 3R and 4R formulations. a) PDMS molecules and b) epoxy resin and hardener.

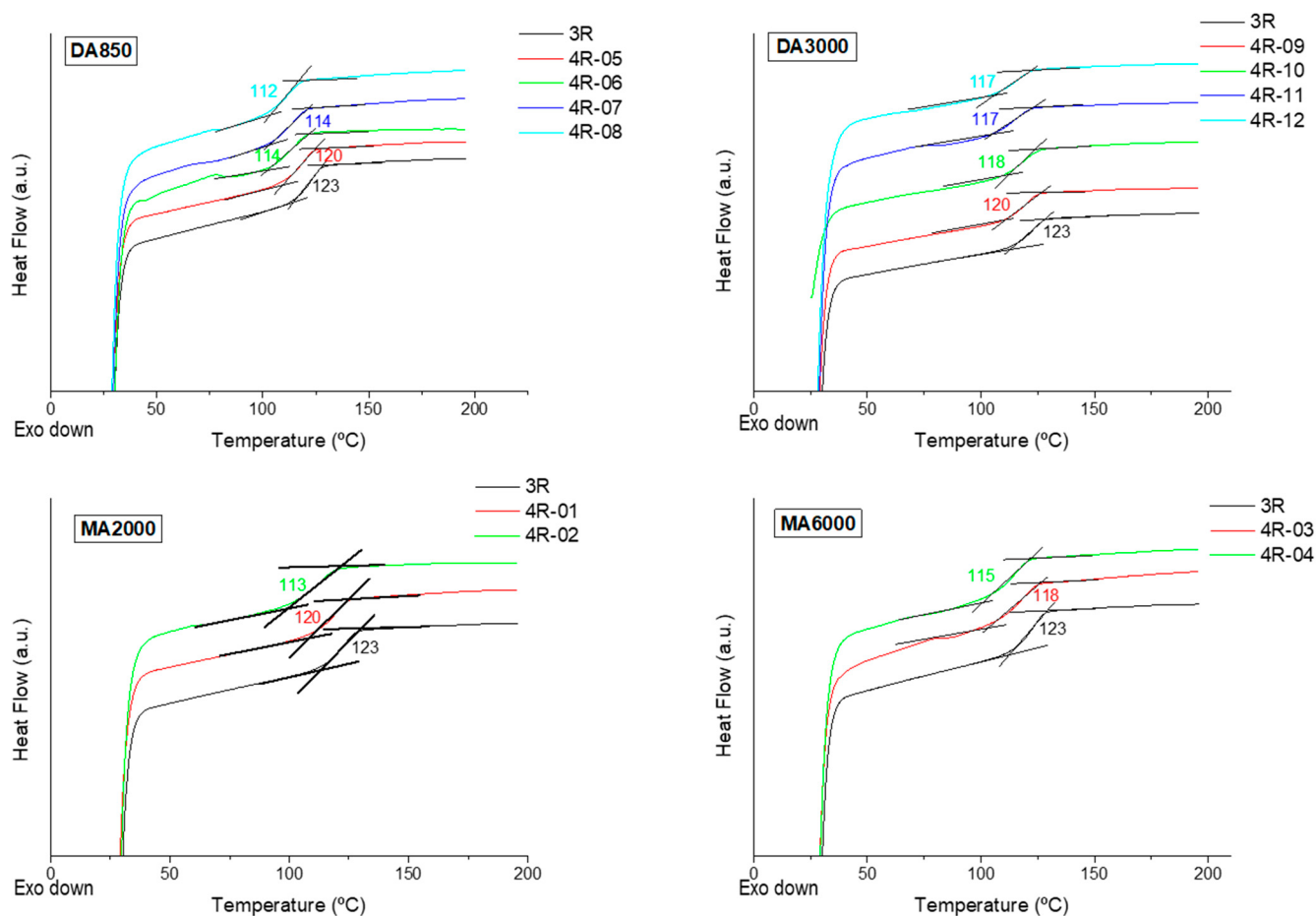


Figure S2. DSC curves of neat and modified thermosetting systems, grouped by the PDMS molecule used.

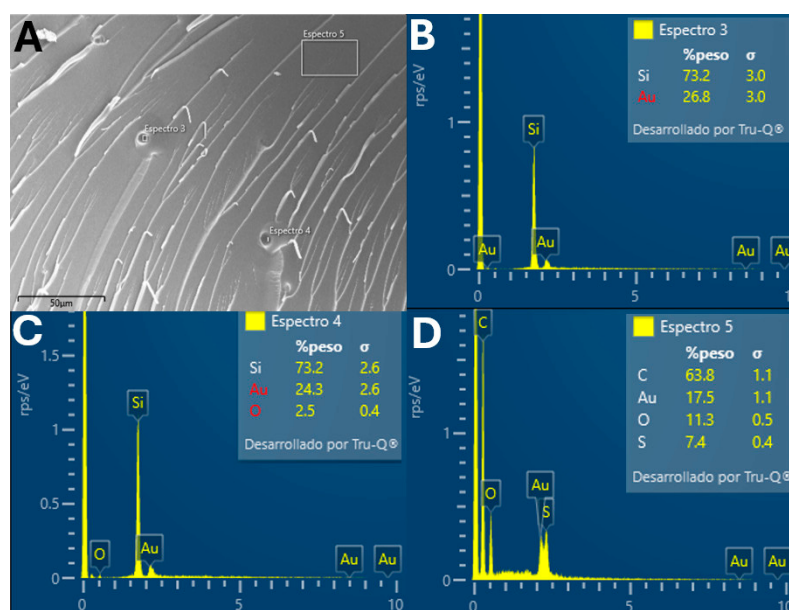


Figure S3. FESEM micrograph (A) and EDX analyses of two zones rich on Si (B and C) and one zone without Si (D) of 4R-08 thermoset.

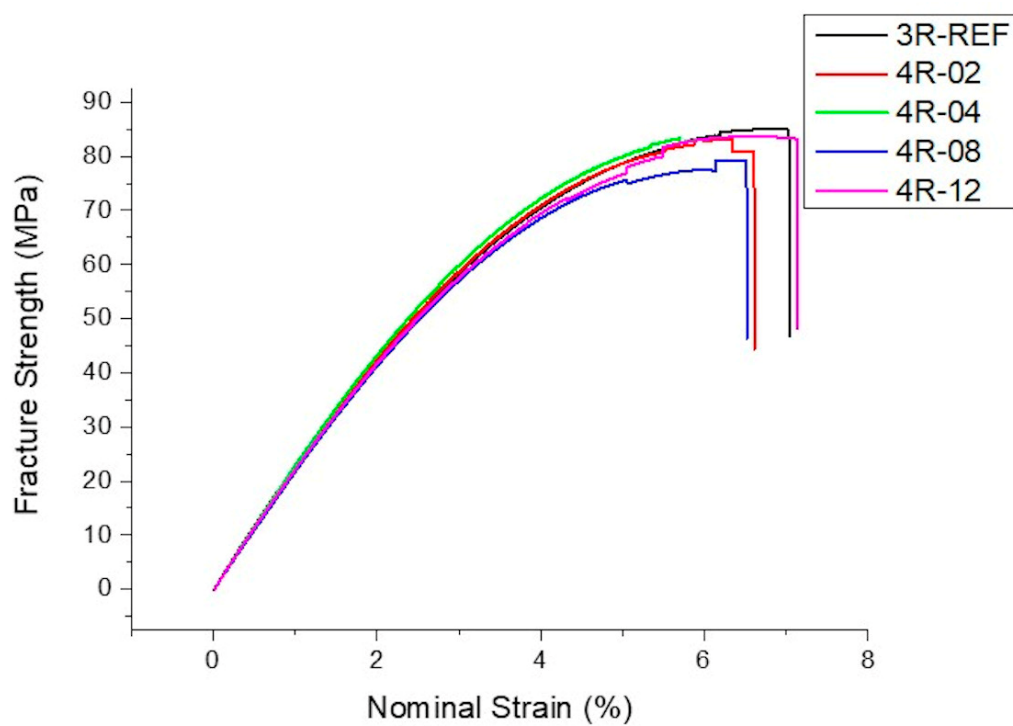


Figure S4. Strength vs Strain curves for the 3R and 4R formulations.

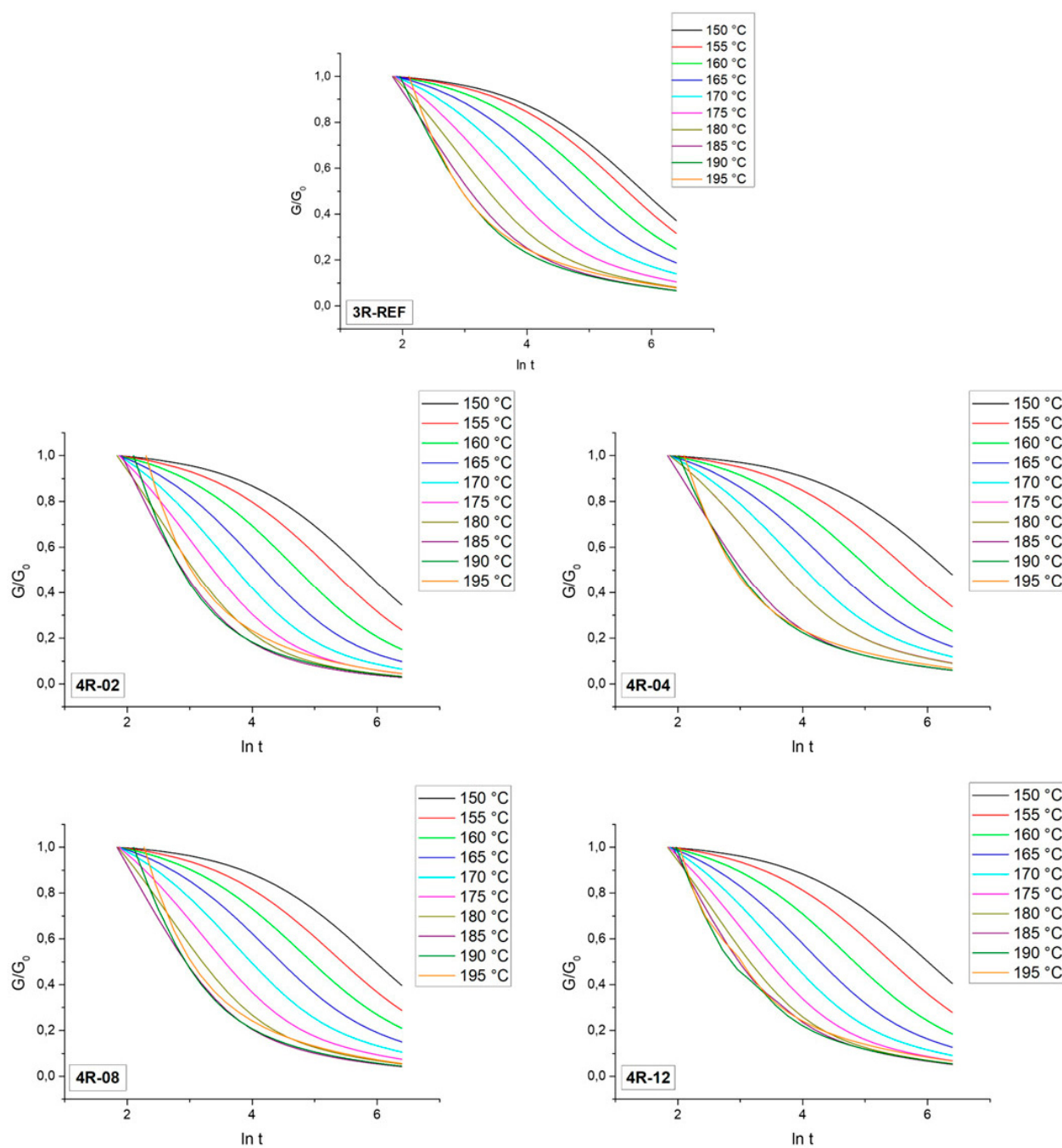
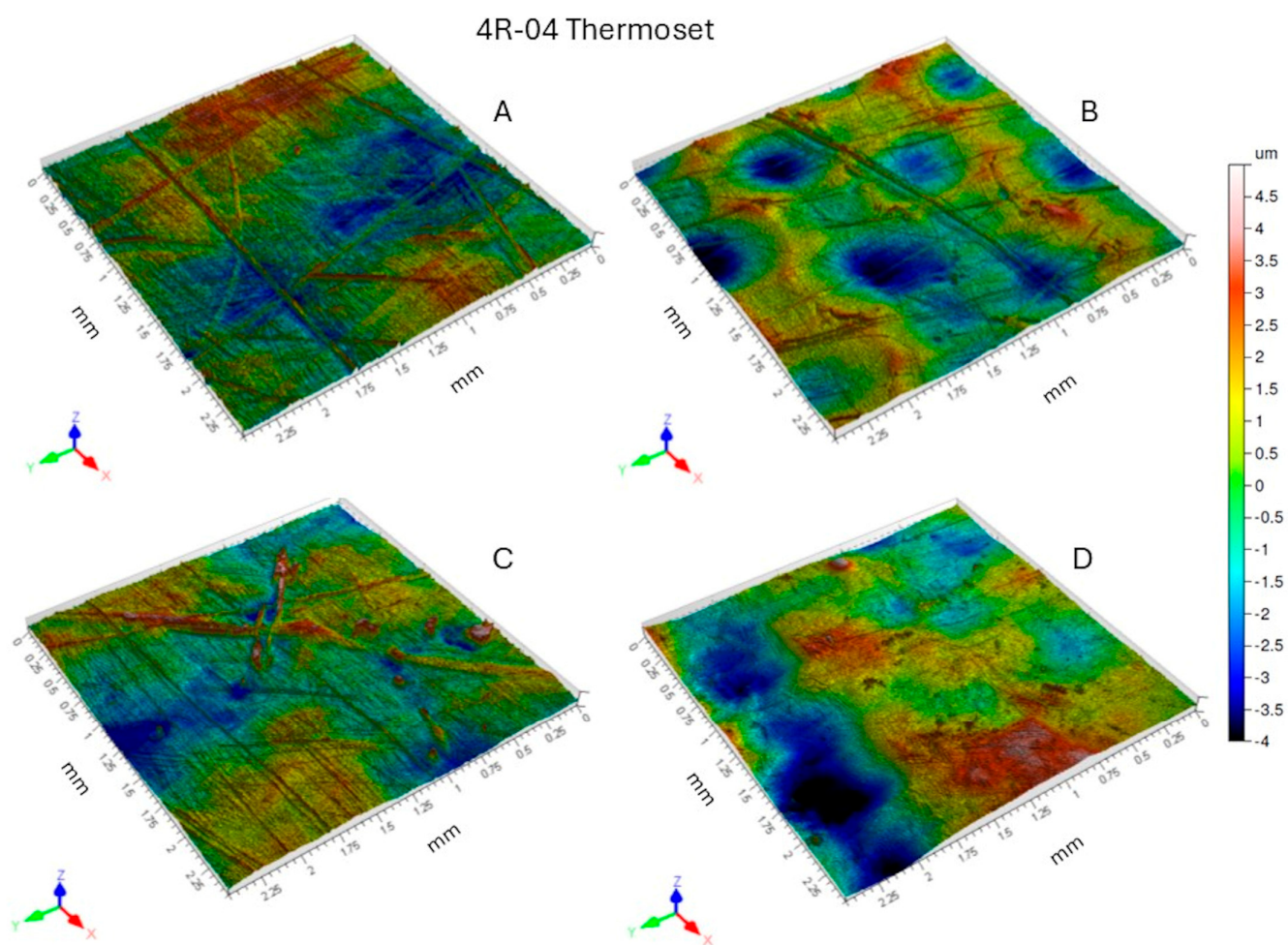


Figure S5. DMA analyses of the stress relaxation behavior of the prepared formulations.



Figures S6. Confocal images of initial 3R (A) and 4R (B) thermosets and of 3R (C) and 4R (D) thermosets after the reprocessing cycle.