

*Supplementary Information for*

## A new strategy to prepare polymer composites with versatile shape memory properties

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**Table S1** Multi-stage recovery thermomechanical cycles of SEBS-50

Cycle Number	1	2	3	4	5
R <sub>r</sub> (35 °C) (%)	11	9	8	9	7
R <sub>r</sub> (40 °C) (%)	19	16	19	18	17
R <sub>r</sub> (45 °C) (%)	36	32	36	33	34
R <sub>r</sub> (50 °C) (%)	72	70	67	65	65
R <sub>r</sub> (55 °C) (%)	99	98	97	97	97

**Table S2** Multi-stage recovery thermomechanical cycles of SEBS-20

Cycle Number	1	2	3	4	5
R <sub>r</sub> (40 °C) (%)	3	2	4	2	2
R <sub>r</sub> (45 °C) (%)	14	14	14	9	11
R <sub>r</sub> (50 °C) (%)	27	26	26	21	21
R <sub>r</sub> (55 °C) (%)	78	77	78	74	76
R <sub>r</sub> (60 °C) (%)	99	98	97	95	97

**Table S3** Triple-shape memory thermomechanical cycles of SEBS-20

Cycle Number	1	2	3	4	5
R <sub>f</sub> (C→A) (%)	99	99	92	93	93
R <sub>f</sub> (A→B) (%)	92	90	89	90	88
R <sub>r</sub> (B→A) (%)	79	78	82	80	78
R <sub>r</sub> (A→C) (%)	99	99	99	99	99
Recovery time(B→A) (s)	10	12	11	11	10
Recovery time(A→C) (s)	2	2	2	2	2

**Table S4** Triple-shape memory thermomechanical cycles of SEBS-50

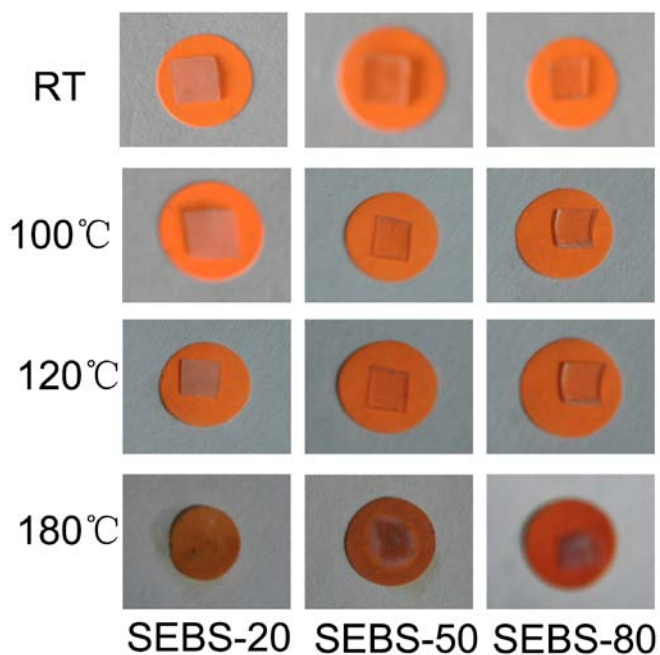
<b>Cycle Number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
R <sub>f</sub> (C→A) (%)	88	86	87	90	88
R <sub>f</sub> (A→B) (%)	83	85	85	85	82
R <sub>r</sub> (B→A) (%)	85	87	85	92	87
R <sub>r</sub> (A→C) (%)	99	99	99	99	99
Recovery time(B→A) (s)	7	8	8	6	10
Recovery time(A→C) (s)	2	2	2	2	2

**Table S5** Triple-shape memory thermomechanical cycles of SEBS-80

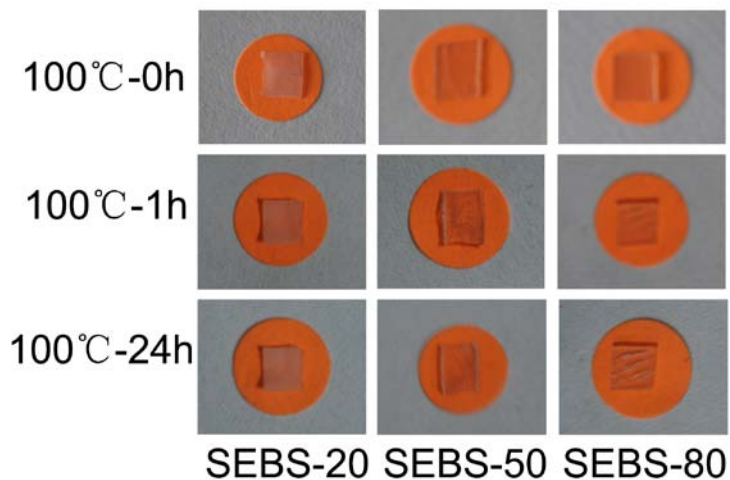
<b>Cycle Number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
R <sub>f</sub> (C→A) (%)	68	62	66	66	64
R <sub>f</sub> (A→B) (%)	78	83	78	75	74
R <sub>r</sub> (B→A) (%)	99	99	99	99	99
R <sub>r</sub> (A→C) (%)	99	99	99	99	99
Recovery time(B→A) (s)	3	4	3	3	5
Recovery time(A→C) (s)	1	1	1	1	1

**Table S6** Quadruple-shape memory thermomechanical cycles of SEBS-20

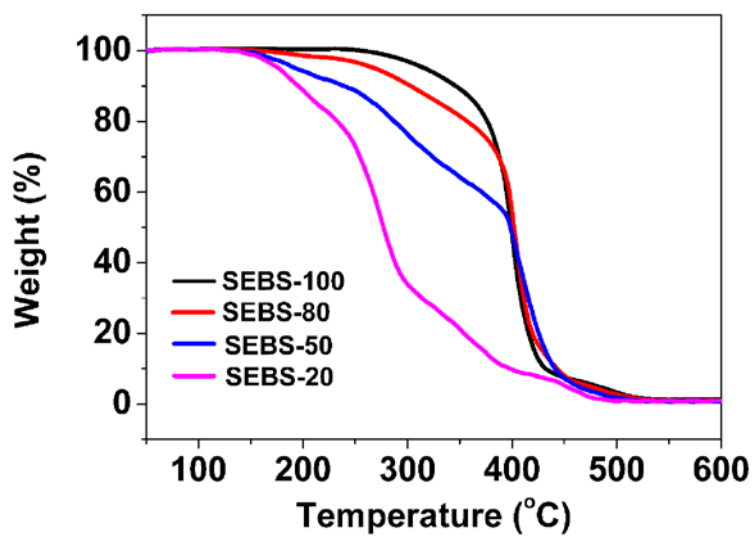
<b>Cycle Number</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
R <sub>f</sub> (D→A) (%)	80	84	80	78	86
R <sub>f</sub> (A→B) (%)	60	55	64	54	58
R <sub>f</sub> (B→C) (%)	80	76	75	85	77
R <sub>r</sub> (C→B) (%)	75	78	80	82	80
R <sub>r</sub> (B→A) (%)	67	79	78	69	77
R <sub>r</sub> (A→D) (%)	99	99	99	99	99



**Figure S1** Photographs of SEBS/paraffin composites after holding at different temperatures.



**Figure S2** Photographs of SEBS/paraffin composites after holding at 100°C for different time.



**Figure S3** TGA curves of SEBS/paraffin composites.