

Biocompatible Thermal Shape-Memory Poly(lactide-*co*-trimethylene carbonate) Elastomers for Cell Culture Scaffold Application

Shihao Zhang^{a#}, Xu Li^{a#}, Dong Zhou^a, Wei Luo^d, Ruiying He^a, João Rodrigues^b, Helena Tomás^b, Ruilong Sheng^b, Yulin Li^{ad*}, Lv Wang^{c*} and Changsheng Liu^{ad*}

^a*The Key Laboratory for Ultrafine Materials of Ministry of Education, Engineering Research Centre for Biomedical Materials of Ministry of Education, Frontiers Science Center for Materiobiology and Dynamic Chemistry, School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, China*

^b*CQM-Centro de Química da Madeira, MMRG, Universidade da Madeira, Campus da Penteada, 9000-390 Funchal, Madeira, Portugal*

^c*Department of Thoracic Surgery, Honghui Hospital, Xi'an Jiaotong University, Xian, 710000, China*

^d*Wenzhou Key Laboratory of Tissue Regeneration Medical Materials, Wenzhou Institute of Shanghai University, Wenzhou 325000, China*

[#]*These authors contributed equally to this work.*

^{*}*Email: yulinli@ecust.edu.cn; liucs@ecust.edu.cn*

Contents

Fig.S1 The effect of catalyst contents on the number-average molecular weight of PDT.

Fig.S2 The effect of reaction time on the number-average molecular weight of PDT.

Fig.S3 The effect of reaction temperature on the number-average molecular weight of PDT.

Table S1 Factors and levels of orthogonal test.

Table S2 Design and results of orthogonal test.

Fig.S4 The range analysis of orthogonal experiment.

Table S3 Polymerization conditions and results for the PDT copolymers.

Fig.S5 Plasticizing temperature (TP) of PDT copolymers with different DLLA-TMC molar ratios (20~50%).

Fig.S6 Oscillatory strain sweep experiment to establish the linear viscoelastic region (LVR): (A) PDLLA; (B) PDT-30; (C) PTMC.

Fig.S7 Elastic modulus of PDT copolymers with different DLLA-TMC molar ratios (20~50%).

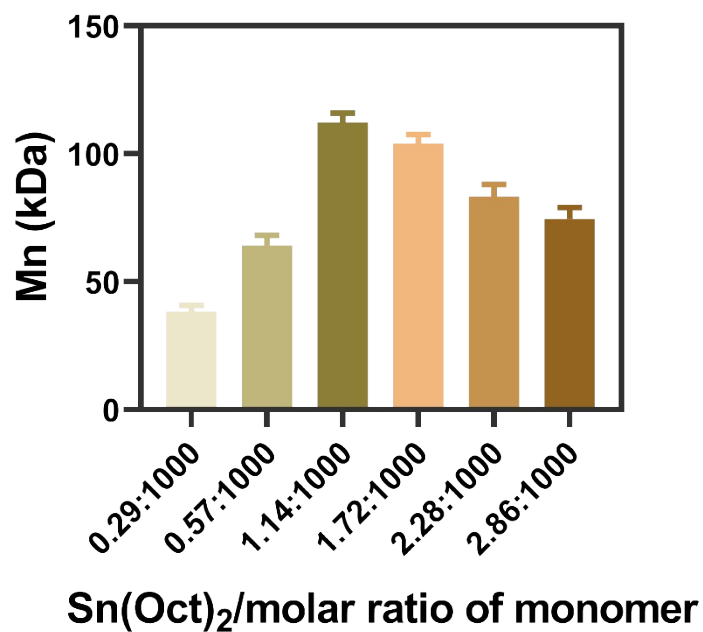


Fig.S1 The effect of catalyst contents on the number-average molecular weight of PDT.

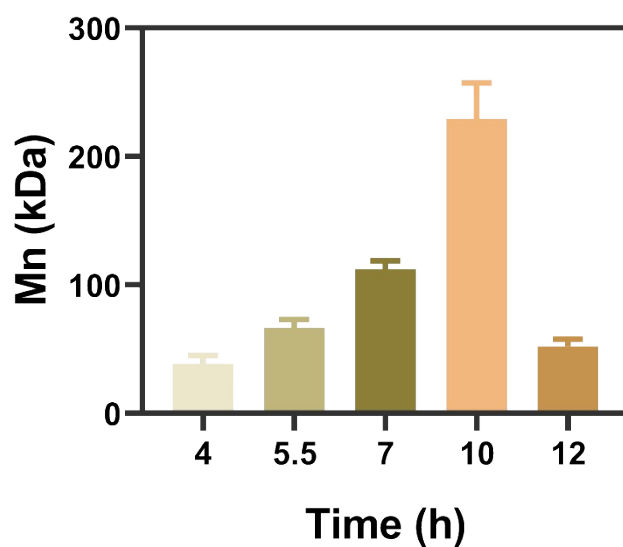


Fig.S2 The effect of reaction time on the number-average molecular weight of PDT.

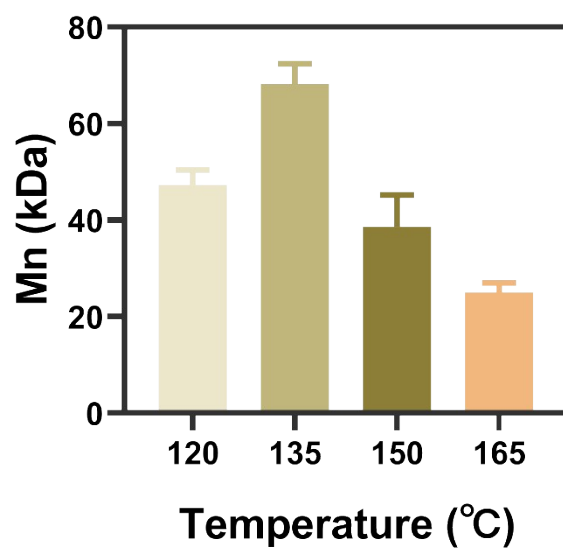


Fig.S3 The effect of reaction temperature on the number-average molecular weight of PDT.

Table S1 Key factors and levels of orthogonal experiment

Factors	Levels		
	1	2	3
A (Temperature) /°C	120	135	150
B (Sn(Oct) ₂ /molar ratio of monomers)	0.5:1000	1:1000	2:1000
C (Time) /h	4	5.5	7

Table S2 Design and results of orthogonal experiment

Number	A	B	C	M _n (kDa)
1	1	1	1	3.149
2	1	2	2	12.913
3	1	3	3	48.053
4	2	1	2	68.263
5	2	2	3	64.052
6	2	3	1	72.417
7	3	1	3	39.267
8	3	2	1	44.880
9	3	3	2	31.825
Sum 1	64.115	110.679	120.446	N/A
Sum 2	204.732	121.765	113.001	N/A
Sum 3	115.972	152.295	151.372	N/A
average1	21.37	36.893	40.15	N/A
average2	68.244	40.615	37.667	N/A
average3	38.66	50.765	50.457	N/A
Range	46.874	13.872	12.79	N/A

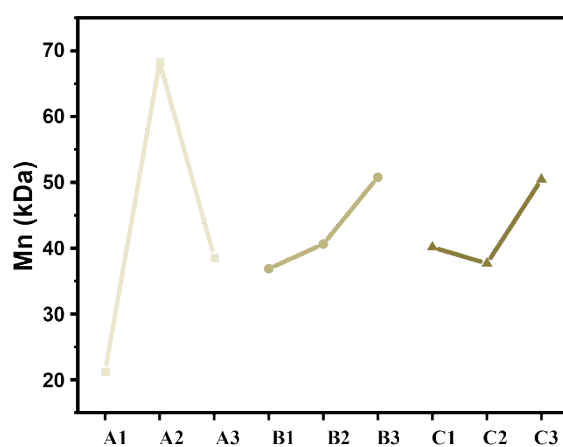
**Fig.S4** The number average molecular weights range analysis of orthogonal experiment.

Table S3 Polymerization conditions and results for the PDT copolymers (PDLLA, PDT 20-PDT 50, PTMC)

Polymer	DLLA: TMC molar ratio	Sn(Oct) ₂ : Monomers molar ratio	Time (h)	Temp. (°C)	<i>M_w</i> (kDa) ^a	<i>M_z</i> (kDa) ^a	<i>M_η</i> (kDa) ^b	DP ^a
PDLLA	100:0	2:1000	7	135	168.05	331.24	54.78	/
PDT 20	80:20	2:1000	7	135	81.12	126.81	41.24	205
PDT 25	75:25	2:1000	7	135	294.21	482.88	62.27	569
PDT 30	70:30	2:1000	7	135	323.46	532.85	61.65	590
PDT 35	65:35	2:1000	7	135	286.00	431.17	78.08	677
PDT 40	60:40	2:1000	7	135	238.61	396.83	68.27	527
PDT 50	50:50	2:1000	7	135	171.00	305.64	32.84	287
PTMC	0:100	2:1000	7	135	390.27	595.49	162.08	/

^a Herein, the weight-average molar mass (*M_w*), Z-average molecular weight (*M_z*), and Degree of Polymerization (DP) were determined using GPC. ^b Viscosity average molecular weight (*M_η*) was determined using the Ubbelohde viscometer.

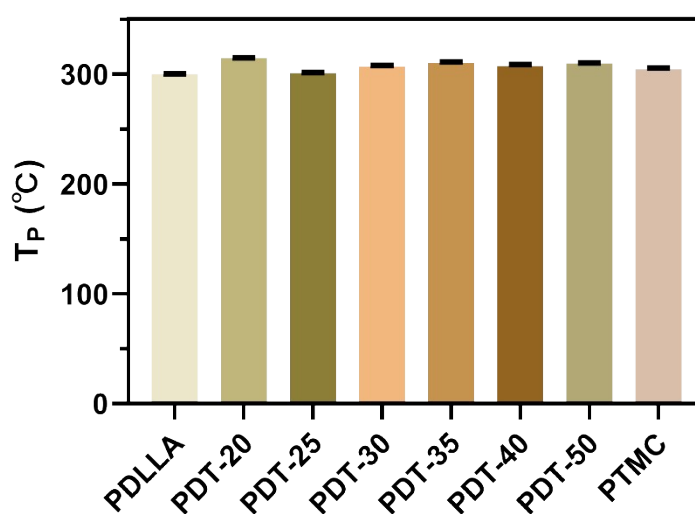


Fig.S5 Plasticizing temperature (TP) of PDT copolymers with different DLLA-TMC molar ratios (20~50%).

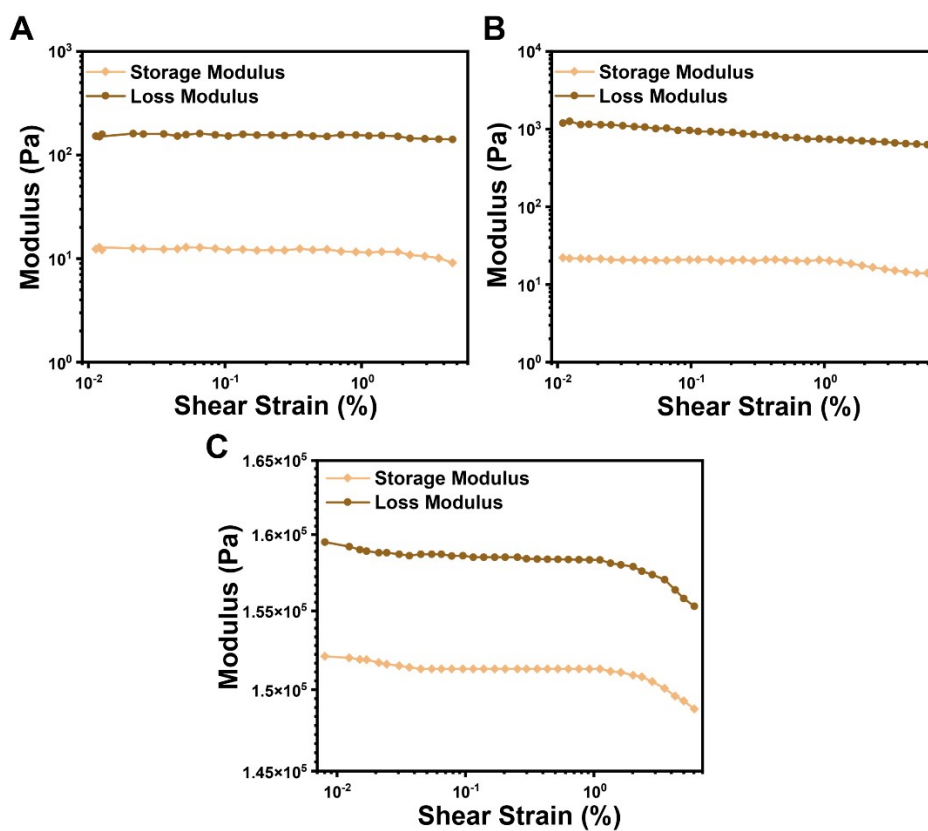


Fig.S6 Oscillatory strain sweep experiment to establish the linear viscoelastic region (LVR): (A) PDLLA; (B) PDT-30; (C) PTMC

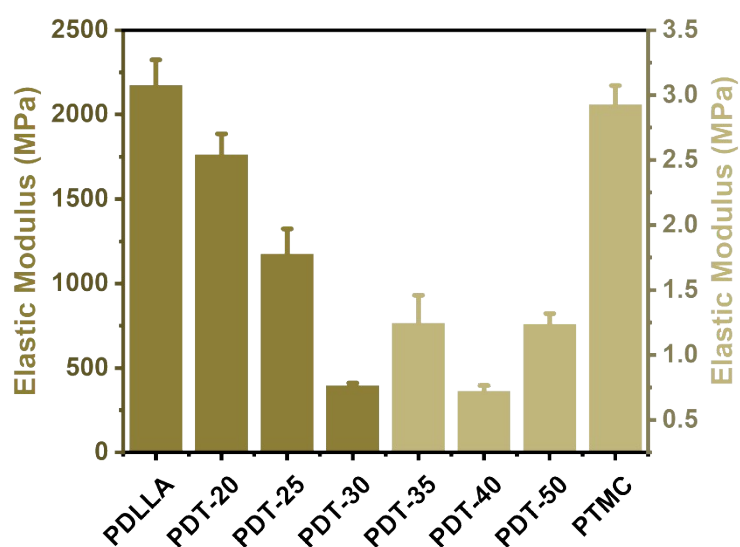


Fig.S7 Elastic modulus of PDT copolymers with different DLLA-TMC molar ratios (20~50%).

