Strong Nucleating Effect of Si–containing Tri–block Oligomers on Poly(ethylene terephthalate）

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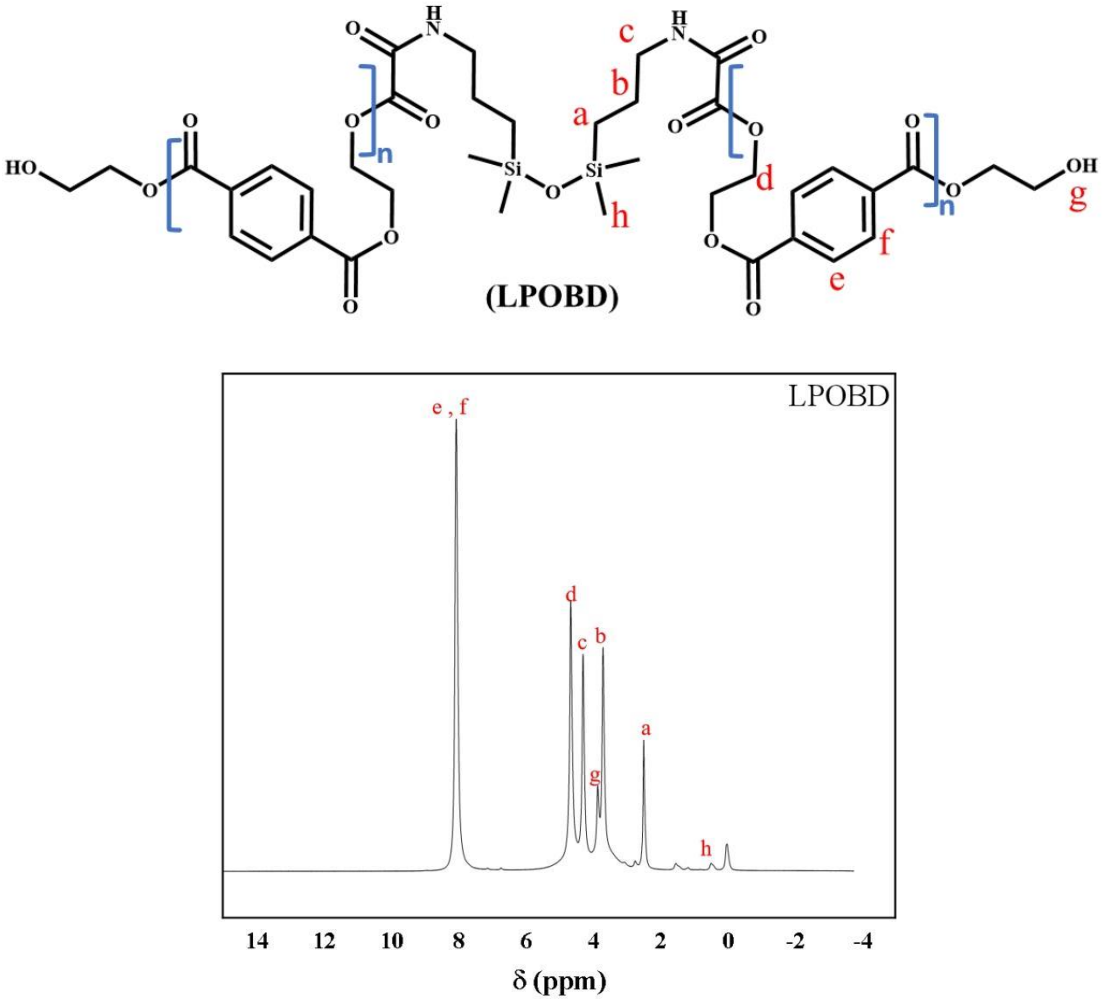


Figure S1. ^{1}H NMR spectrum of LPOBD.

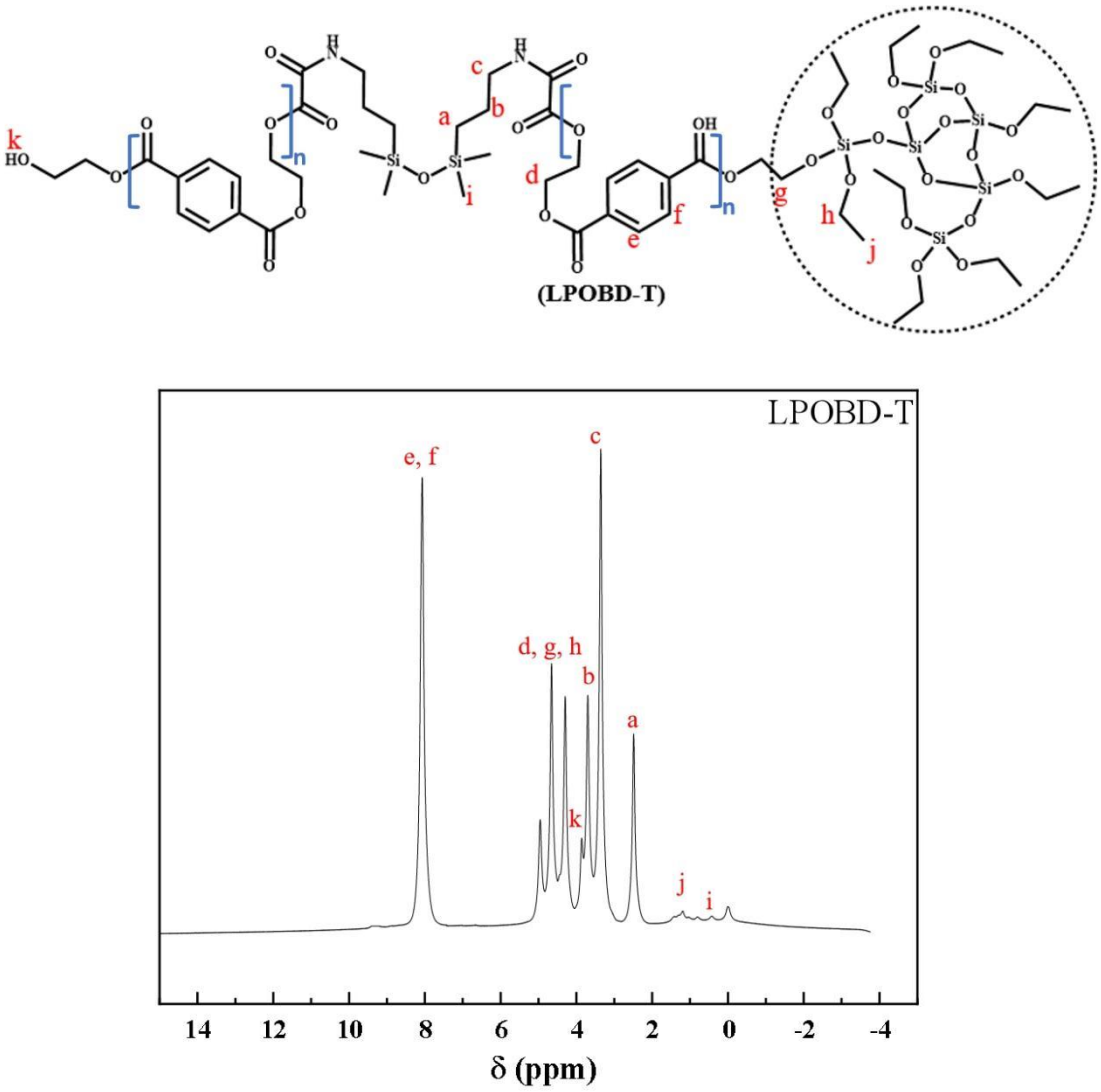


Figure S2. ^{1}H NMR spectrum of LPOBD−T.

Table S1.

The molecular weights of LMPET, LPOBD, and LPOBD−T.

Sample	Mn (g/mol)	Mw (g/mol)	Mw/Mn
LMPET	936	1357	1.45
LPOBD	1930	2576	1.33
LPOBD−T	4283	6167	1.44

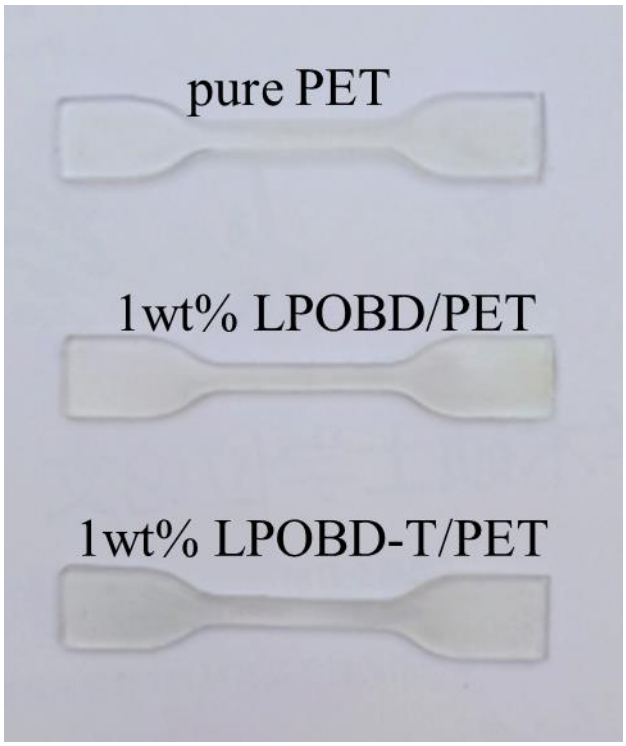


Figure S3. The Shape of PET hybrid materials.

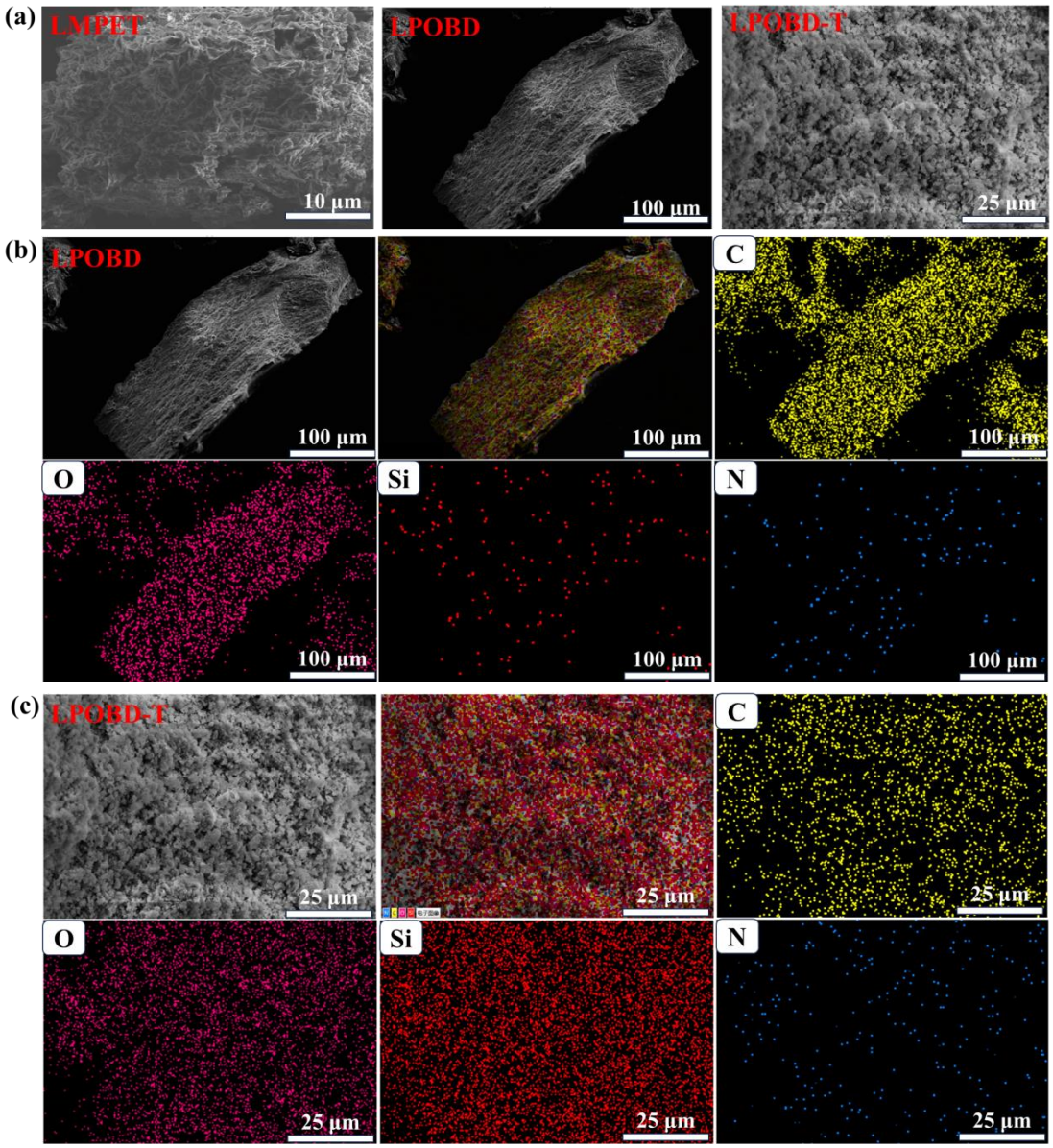


Figure S4. (**a**) SEM images of LMPET, LPOBD and LPOBD−T, and the Elemental Mapping images of (**b**) LPOBD and (c) LPOBD−T.

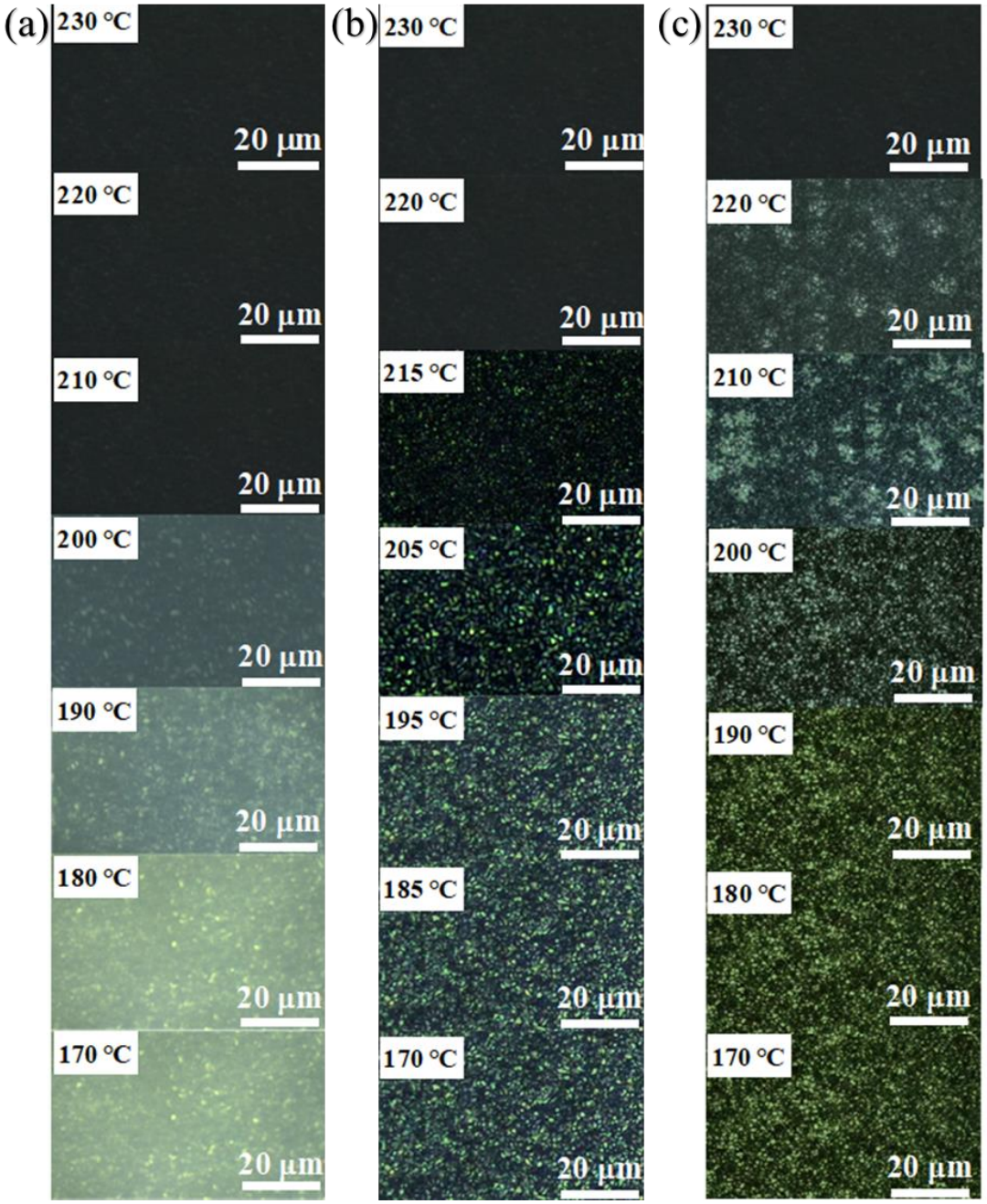


Figure S5. POM images of (**a**) pure PET, (**b**) 1 wt% LPOBD/PET, and (**c**) 1 wt% LPOBD−T/PET.

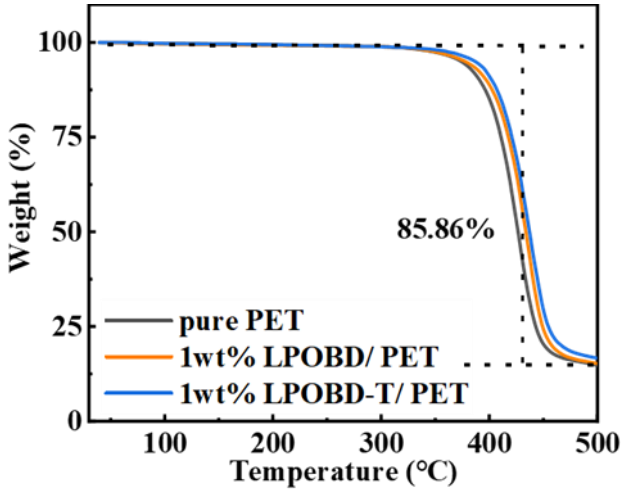


Figure S6. Thermal analysis of hybrid PET materials.

Table S2.

The parameters for materials.

Characterization	Parameters
XRD	5°to 60° with scanning speed of 5 °/min
SEM	Au,0.8nm(15kV), 10kV, 200nA
TEM	60−100kV, DMSO
DSC	5−10 mg, 5/10/15/20 °C/min, N_2
GPC	DMSO
TG	10 °C/min, Air
Xc	ΔH_0=140 J/g

Table S3.

Thermal properties and crystallization kinetics analysis data of LPOBD/PET composites (10 °C/min).

Samples	Tc(°C)	Tm(°C)	ΔHm(J/g)	ΔHc(J/g)	Xc(%)	$t_{1/2}$(s)	n	Kc
Pure PET	182.3	248.7	32.1	31.1	22.2	128	2.35	0.26
0.5%	187.5	250.2	34.5	33.5	24.0	108	2.62	0.31
0.75%	192.4	251.4	35.2	33.7	24.3	102	2.74	0.36
1.0%	199.8	252.5	36.3	34.9	25.2	94	2.76	0.38
1.25%	195.7	251.9	35.8	33.9	24.5	99	2.68	0.35

Table S4.

Thermal properties and crystallization kinetics analysis data of LPOBD−T/PET composites (10 °C/min).

Samples	Tc(°C)	Tm(°C)	ΔHm(J/g)	ΔHc(J/g)	Xc(%)	$t_{1/2}$（s）	n	kc
pure PET	182.3	248.7	32.1	31.1	22.2	128	2.35	0.26
0.5%	189.4	251.3	34.8	33.4	23.9	105	2.77	0.35
0.75%	196.9	253.1	36.2	34.8	25.0	84	2.73	0.39
1.0%	203.4	254.5	37.8	35.3	25.5	75	2.81	0.43
1.25%	198.1	253.4	37.1	34.7	25.1	86	2.84	0.40

Table S5.

The scattering crystallographic plane (hkl), 2θ, dhkl, Lhkl, and xc values of PET materials.

Composition	(*hkl*)	2*θ* (°)	d_{hkl} (Å)	L_{hkl} (nm)	x_c (%)
pure PET	(011)	16.78	5.28	13.5	21.7
	(010)	18.14	4.88	12.3	
	(110)	23.30	3.81	10.6	
	(100)	26.64	3.34	9.8	
1wt% LPOBD/PET	(011)	16.84	5.26	14.1	26.3
	(010)	18.21	4.87	12.7	
	(110)	23.42	3.79	10.9	
	(100)	26.66	3.34	10.2	
1wt% LPOBD−T/PET	(011)	16.92	5.23	14.5	27.5
	(010)	18.17	4.87	13.0	
	(110)	23.46	3.78	10.9	
	(100)	26.72	3.33	10.1	

Table S6.

Thermal properties and crystallization kinetics analysis data of 1wt% LPOBD/PET composites at different cooling rates.

Samples	Tc(°C)	Tm(°C)	ΔHm(J/g)	ΔHc(J/g)	Xc(%)	$t_{1/2}$(s)	n	Kc
5 °C/min	198.5	252.1	31.5	30.0	21.6	125	2.71	0.31
10 °C/min	199.8	252.5	36.3	34.9	25.2	94	2.76	0.38
15 °C/min	201.1	253.7	45.6	43.9	31.7	86	–	–
20 °C/min	200.3	252.9	38.2	35.4	25.5	78	–	–

Table S7.

Thermal properties and crystallization kinetics analysis data of 1wt% LPOBD−T/PET composites.

Samples	Tc(°C)	Tm(°C)	ΔHm(J/g)	ΔHc(J/g)	Xc(%)	$t_{1/2}$（s）	n	kc
5 °C/min	202.7	253.7	32.1	30.2	21.8	106	2.75	0.36
10 °C/min	203.4	254.5	37.8	35.3	25.5	75	2.81	0.43
15 °C/min	204.9	255.8	46.3	44.7	32.2	70	–	–
20 °C/min	203.2	253.9	36.9	35.0	25.3	58	–	–

Table S8.

Thermal properties of hybrid PET materials.

Sample	$T_{10\%}$ (°C)	$T_{50\%}$ (°C)	T_{max} (°C)
pure PET	391.17	426.77	464.82
1% LPOBD/PET	395.41	429.63	471.53
1% LPOBD−T/PET	397.38	433.10	478.46

Table S9.

Abbreviations and their corresponding full names.

Abbreviations	Full names
PET	Poly(ethylene terephthalate)
LMPET	Low molecular weight PET
BATD	1,3−bis(3−aminopropyl)− 1,1,3,3−tetramethyldisiloxane
TEOS	Tetraethyl orthosilicate
OBD	oxalic acid/BATD/oxalic acid
LPOBD	BATD/oxalic acid/LMPET
LPOBD−T	BATD/oxalic acid/LMPET/TEOS

Table S10.

A comparison between the results of this paper and the published results.

Items	1	2	This paper
Material	Nano−SiO_2	Tetraethyl Orthosilicate	1,3−bis(3−aminopropyl)− 1,1,3,3−tetramethyldisiloxane
Optimum dosage	2 wt%	0.75 wt%	1 wt%
The increase in melting temperature	17.7 °C	10.3 °C	5.8 °C
The increase in crystallization temperature	12.3 °C	7.1 °C	21.1 °C
The increase in crystallization	2.3%	8.7%	3.3%