

SUPPORTING INFORMATION

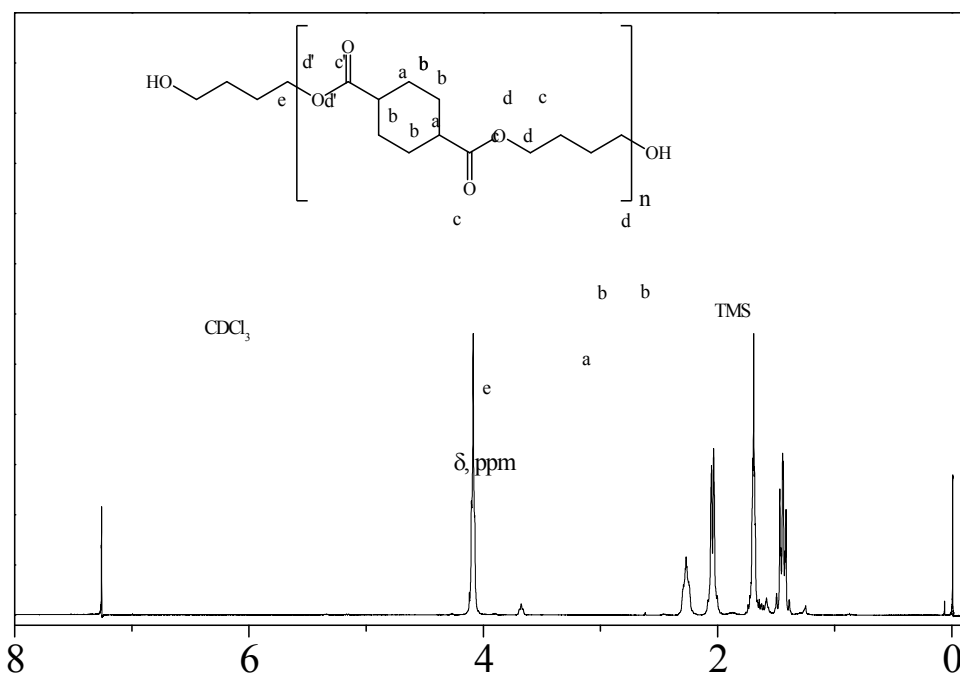


Figure S1. ¹H-NMR spectrum of PBCE-OH with resonance assignments.

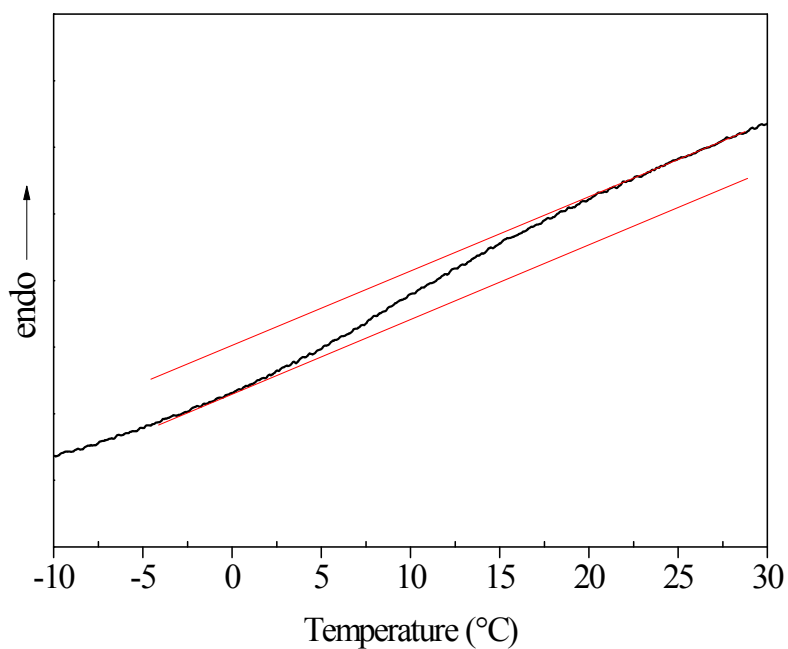


Figure S2. Calorimetric curve of PBCE in the region -10 to 30°C to visualize the glass transition. Red lines serve as eye guides to highlight the phenomenon.

Table S1. Thermal characterization data (II scan DSC after quenching from the melt).

<i>Polymer</i>	II scan, DSC					
	T_g (°C)	ΔC_p (J/°C g)	T_{m,1} (°C)	ΔH_{m,1} (J/g)	T_{m,2} (°C)	ΔH_{m,2} (J/g)
<i>PBCE</i>	9	0.141	-	-	166	33
<i>A50B50</i>	-34	0.330	52	3	143	13
<i>A30B70</i>	-31	0.389	64	16	134	8
<i>A50C50</i>	-29	0.440	-	-	119	17
<i>A30C70</i>	-32	0.451	51	2	110	4

Table S2. Degree of crystallinity as a function of the composting time.

<i>Polymer</i>	X_c (%)		
	0 d	56 d	84 d
<i>PBCE</i>	38	39	41
<i>A50B50</i>	28	38	41
<i>A30B70</i>	26	37	40
<i>A50C50</i>	26	43	45
<i>A30C70</i>	24	40	44

<i>Polymer</i>	<i>PBCE</i>	<i>A50B50</i>	<i>A30B70</i>	<i>A50C50</i>	<i>A30C70</i>
Thickness (μm)	146±14	241±13	163±3	262±8	263±29
8°C					
GTR (cm³/m² d bar)	157 ± 1	341 ± 2	329 ± 2	226 ± 1	604 ± 1
S (cm³/cm² bar)		1.2E ⁻⁰² ± 3.4E ⁻⁰³			2.7E ⁻⁰¹ ± 9.4E ⁻⁰³
D (cm²/s)		9.7E ⁻⁰⁷ ± 2.7E ⁻⁷			4.2E ⁻⁰⁸ ± 1.4E ⁻⁹
t_L (s)		128 ± 37			1066 ± 35
15°C					
GTR (cm³/m² d bar)	160 ± 1	1113 ± 2	1026 ± 4	776 ± 2	1070 ± 1
S (cm³/cm² bar)		1.1E ⁰ ± 5E ⁻⁰³	1.4E ⁰ ± 5E ⁻⁰³	3.8 ⁻⁰¹ ± 2E ⁻⁰³	1.4E ⁰ ± 5E ⁻⁰³
D (cm²/s)		3.0E ⁻⁰⁸ ± 8E ⁻¹¹	3.9E ⁻⁰⁸ ± 7E ⁻¹⁰	5.8E ⁻⁰⁸ ± 3E ⁻¹⁰	1.4E ⁻⁰⁸ ± 5E ⁻¹¹

t_L (s)		128 ± 37	3000 ± 57	1678 ± 7	3080 ± 6
23°C					
GTR ($cm^3/m^2 d bar$)	659 ± 2	2627 ± 5	2263 ± 5	2480 ± 8	2473 ± 5
S ($cm^3/cm^2 bar$)	1.2E ⁰ ± 1E ⁻⁰²	1.2E ⁰ ± 5E ⁻⁰³	1.3E ⁰ ± 5E ⁻⁰³	1.3E ⁰ ± 8E ⁻⁰³	1.4E ⁰ ± 3E ⁻⁰²
D (cm^2/s)	9.3E ⁻⁰⁹ ± 8E ⁻¹¹	6.7E ⁻⁰⁸ ± 1E ⁻¹⁰	5.4E ⁻⁰⁸ ± 2E ⁻¹	5.5E ⁻⁰⁸ ± 3E ⁻¹⁰	3.2E ⁻⁰⁸ ± 7E ⁻¹⁰
t_L (s)	3810 ± 34	1716 ± 3	2126 ± 6	1775 ± 11	1369 ± 30

Table S3. Permeability data of CO₂ gas at 8, 15 and 23°C and film thickness.

Table S4. Perm-selectivity values at 8,15 and 23°C.

<i>Polymer</i>	CO ₂ /O ₂	CO ₂ /N ₂	CO ₂ /C ₂ H ₄	CO ₂ /O ₂	CO ₂ /N ₂	CO ₂ /C ₂ H ₄	CO ₂ /O ₂	CO ₂ /N ₂	CO ₂ /C ₂ H ₄
	8°C			15°C			23°C		
<i>PBCE</i>	1.01	1.57	2.41	1.01	1.62	0.92	1.49	7.42	4.20
<i>A50B50</i>	2.19	2.46	2.11	4.12	9.41	8.45	5.47	12.83	7.67
<i>A30B70</i>	3.06	4.93	3.40	5.31	8.82	7.45	7.12	10.76	5.24
<i>A50C50</i>	0.94	1.74	1.51	3.39	6.83	4.91	4.63	11.92	5.65
<i>A30C70</i>	3.06	4.93	3.40	5.31	8.82	7.45	5.30	13.97	7.09

Table S5. Activation energy for the gas transmission rate (E_{GTR}), the Heat of Solution (H_S) and the Diffusion (E_D) process at 8, 15 and 23°C. In the brackets the linear regression coefficients (R^2).

<i>Polymer</i>	E_{GTR} (J/mol)	H_S (J/mol)	E_D (J/mol)	E_{GTR} (J/mol)	H_S (J/mol)	E_D (J/mol)
	O₂			CO₂		
<i>PBCE</i>	48 ± 0.16 (0.8)	-	--	66 ± 0.11 (0.8)	--	--
<i>A50B50</i>	52 ± 0.16 (1)	--	--	94 ± 0.13 (1)	211 ± 0.18 (0.7)	-121 ± 0.13 (0.5)
<i>A30B70</i>	-6 ± 0.22 (0.2)	116 ± 0.24 (1)	100 ± 0.13 (1)	89 ± 0.10 (1)	-9 ± 0.07 (1)	30 ± 0.03 (1)
<i>A50C50</i>	37 ± 0.10 (0.7)	--	--	111 ± 0.19 (1)	108 ± 0.15 (1)	-5 ± 0.20 (1)
<i>A30C70</i>	40 ± 0.21 (0.8)	--	--	65 ± 0.22 (1)	76 ± 0.19 (1)	-10 ± 0.22 (0.0)
	N₂			C₂H₄		
<i>PBCE</i>	-6 ± 0.11			39 ± 0.20		

	(0.8)			(0.6)		
<i>A50B50</i>	19 ± 0.10 (0.5)	--	--	35 ± 0.05 (0.6)	--	--
<i>A30B70</i>	10 ± 0.13 (0.2)	--	--	67 ± 0.21 (1)	--	--
<i>A50C50</i>	22 ± 0.28 (0.6)	--	--	50 ± 0.12 (0.8)	--	--
<i>A30C70</i>	17 ± 0.12 (0.8)	--	--	32 ± 0.03 (0.6)	--	--