

Introduction of KURARITY™ KL-LT236 for Surface Protection Film

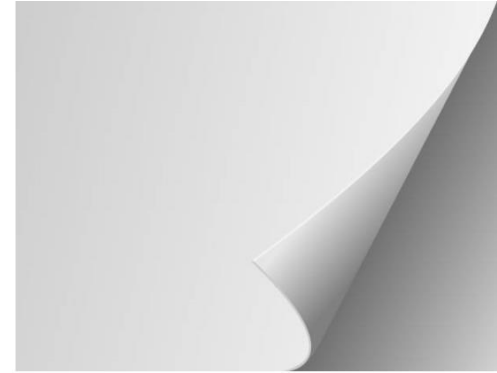
KURARITY business promotion dept.
Elastomer Division

kuraray

Introduction of KURARITY™ KL-LT236

Excellent adhesive features for surface protection film;

- ☆ **Co-extrusion type :**
Lower VOC compared with solution coating
- ☆ **Versatility :**
Excellent adhesion to various materials and shapes
- ☆ **Clean :**
No pollution to the substrates
- ☆ **Smooth peeling :**
Zipping (Stick-slip) free
Superior adhesion stability with time and temperature



Adhesion properties of KURARITY™ KL-LT236

Film structure (T-die) : Base layer (block-PP) / Adhesive layer = 54μm / 6μm

*Hydrogenated Styrenic Block Copolymer (HSBC) / Tackifier (TF) compound (CPD)

		KURARITY™ KL-LT236	Conventional HSBC/TF CPD*1			Conventional HSBC/TF CPD2						
Unwinding force (90° peel)	(N/25mm)	0.6	0.4			0.4						
	Zippering (quiet) + < ++ < +++ (noisy)	+	+			+						
Conditions**		After 20min	After 1 day	After 7 days	After 20min	After 1 day	After 7 days	After 20min	After 1 day	After 7 days		
Adhesive force (180° peel)	PMMA	25 deg.C	5.9 (z)	6.1 (z)	7.3	1.3 (z)	4.3 (z)	5.8 (z)	0.8 (z)	3.5 (z)	4.4 (z)	
		60 deg.C	8.6	7.8	9.4	6.4 (z)	9.0	9.1	4.8 (z)	6.0	8.5	
	Polycarbonate	25 deg.C	3.6	6.3	7.3	1.1 (z)	2.4 (z)	3.3 (z)	0.9 (z)	1.8 (z)	2.6 (z)	
		60 deg.C	8.1	8.5	10.4	4.8 (z)	9.5	10.2	3.4 (z)	7.1 (z)	8.5 (z)	
	N/25mm (Max. value)	PET	25 deg.C	2.5	5.3	5.8	1.2 (z)	2.2 (z)	3.1 (z)	0.9 (z)	1.6 (z)	2.2 (z)
		Foamed PVC	25 deg.C	0.1	0.2	0.3	0.2	0.2	0.2 (z)	0.1	0.2	0.3 (z)
Z***=Zippering	Stainless Steel 304(BA)	25 deg.C	1.9	1.1	1.8	0.9 (z)	1.0 (z)	2.3 (z)	1.0 (z)	1.2 (z)	2.0 (z)	
		60 deg.C	1.4	0.8	6.8	0.3 (z)	0.3 (z)	1.1 (z)	0.2 (z)	0.3 (z)	1.1 (z)	
	Aluminum	25 deg.C	0.8	0.4	0.3	0.4 (z)	0.7 (z)	0.6 (z)	0.3 (z)	0.9 (z)	0.3 (z)	

**Unwinding / Adhesive force : Test speed 900 mm/min
Stored at 25 deg.C or 60 deg.C for 20 min to 7 days, then peeled at 23 deg.C

Adhesion properties of KURARITY™ KL-LT236

Adhesion properties (Difference in film structure (T-die))

Film structure	Outer	-	-	Block PP (10μm)							
	Base layer	Block PP (54μm)	Block PP / Homo PP = 70 / 30 (54μm)	Homo PP / LDPE = 80 / 20 (44μm)							
	Adhesive layer	KURARITY™ KL-LT236 (6μm)	KURARITY™ KL-LT236 (6μm)	KURARITY™ KL-LT236 (6μm)							
Unwinding force (90° peel)	(N/25mm)	0.6	0.7	0.7							
	Zippering (quiet) + < ++ < +++ (noisy)	+	+	+							
Adhesive force (180° peel)	Conditions*	After 20min	After 1 day	After 7 days	After 20min	After 1 day	After 7 days	After 20min	After 1 day	After 7 days	
	PMMA	25 deg.C	5.9 (z)	6.1 (z)	7.3	6.3 (z)	6.7	6.2	7.9	8.8	9.2
N/25mm (Max. value)	Foamed PVC	25 deg.C	0.1	0.2	0.3	0.1	0.1	0.1	0.1	0.3	0.3
		60 deg.C	8.6	7.8	9.4	6.9	5.8	7.3	8.9	10.2	10.6
Z**=Zippering	Stainless Steel 304(BA)	25 deg.C	1.9	1.1	1.8	1.7	1.4	2.9	6.3	7.9	9.9
		60 deg.C	1.4	0.8	6.8	0.9	0.4	3.4	8.3	11.8	13.4
	Aluminum	25 deg.C	0.8	0.4	0.3	0.4	0.2	0.3	3.4	3.4	4.0

*Unwinding / Adhesive force : Test speed 900mm/min
Stored at 25 deg.C or 60 deg.C for 20 min to 7 days, then peeled at 23 deg.C

- Adhesive strength can be adjusted by film structure

Adhesion properties of KURARITY™ KL-LT236

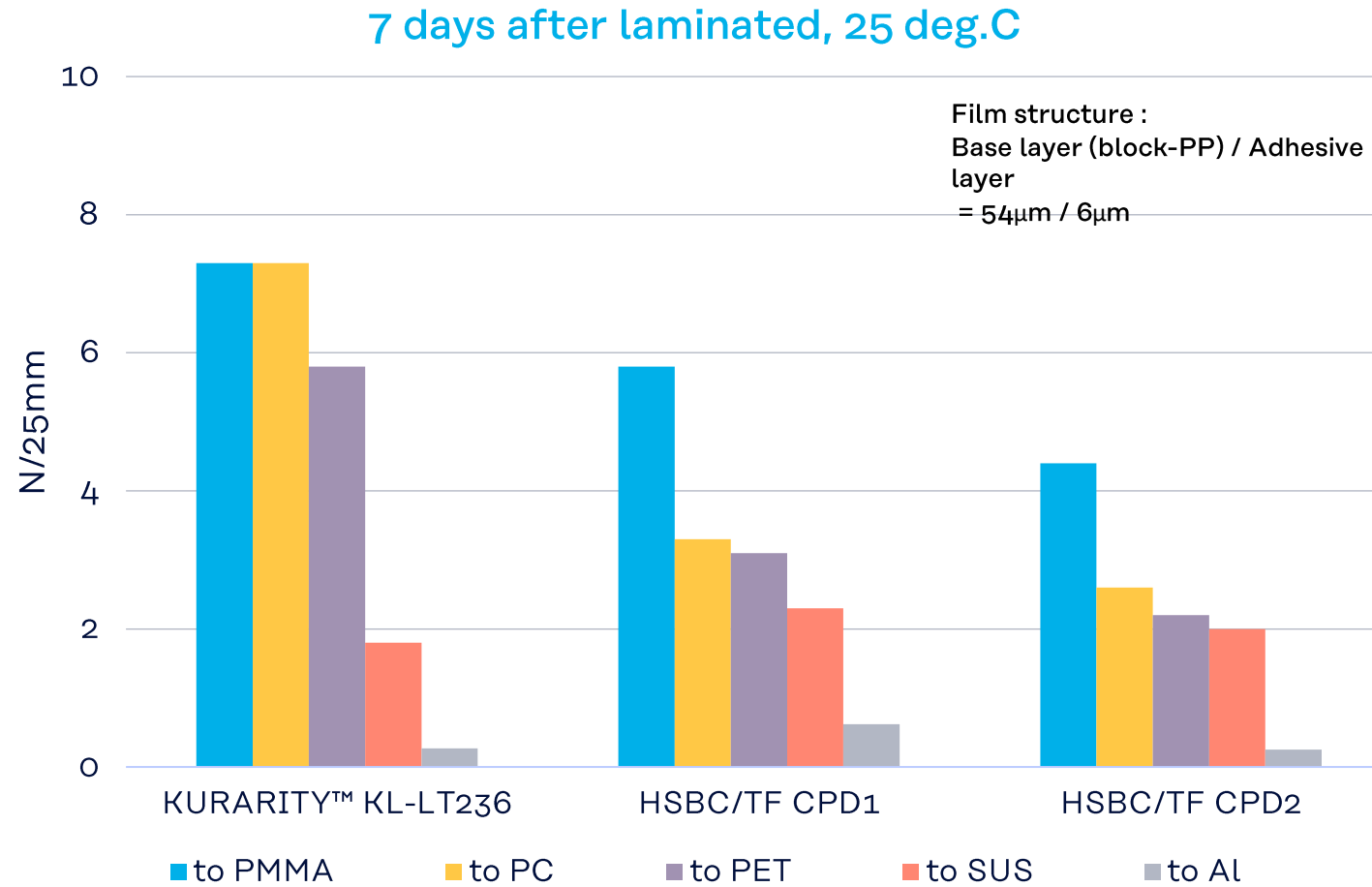
Film structure (T-die) : Outer (block-PP) / Base layer (homo-PP / LDPE) / Adhesive layer = 10μm / 44μm / 6μm

		KURARITY™ KL-LT236			Conventional HSBC/TF CPD2			
Unwinding force (90° peel) Test speed 900mm/min	(N/25mm)	0.7			0.6			
	Zippering (quiet) + < ++ < +++ (noisy)	+			+			
Conditions*		After 20min	After 1 day	After 7 days	After 20min	After 1 day	After 7 days	
Adhesive force to substrates (180° peel) Test speed 900mm/min	PMMA	25 deg.C	7.9	8.8	9.2	7.5 (z)	10.3 (z)	11.5 (z)
		60 deg.C	8.9	10.2	10.6	11.0 (z)	16.4	16.2
	Polycarbonate	25 deg.C	7.3	8.9	9.6	4.9 (z)	7.0 (z)	7.6 (z)
		60 deg.C	9.3	11.4	11.5	8.9 (z)	15.6 (z)	17.5
N/25mm (Max. value) **Z=Zippering	PET	25 deg.C	7.6	8.0	9.2	6.1 (z)	7.6 (z)	6.9 (z)
	Foamed PVC	25 deg.C	0.1			0.5	0.9	1.3 (z)
	Stainless Steel 304(BA)	25 deg.C	6.3	7.9	9.9	8.3 (z)	10.3 (z)	13.0 (z)
60 deg.C		8.3	11.8	13.4	12.2(z)	16.1 (z)	21.5	
	Aluminum	25 deg.C	3.4	3.4	4.0	7.9 (z)	8.2 (z)	8.7 (z)

*Unwinding / Adhesive force : Test speed 900mm/min
Stored at 25 deg.C or 60 deg.C for 20 min to 7 days, then peeled at 23 deg.C

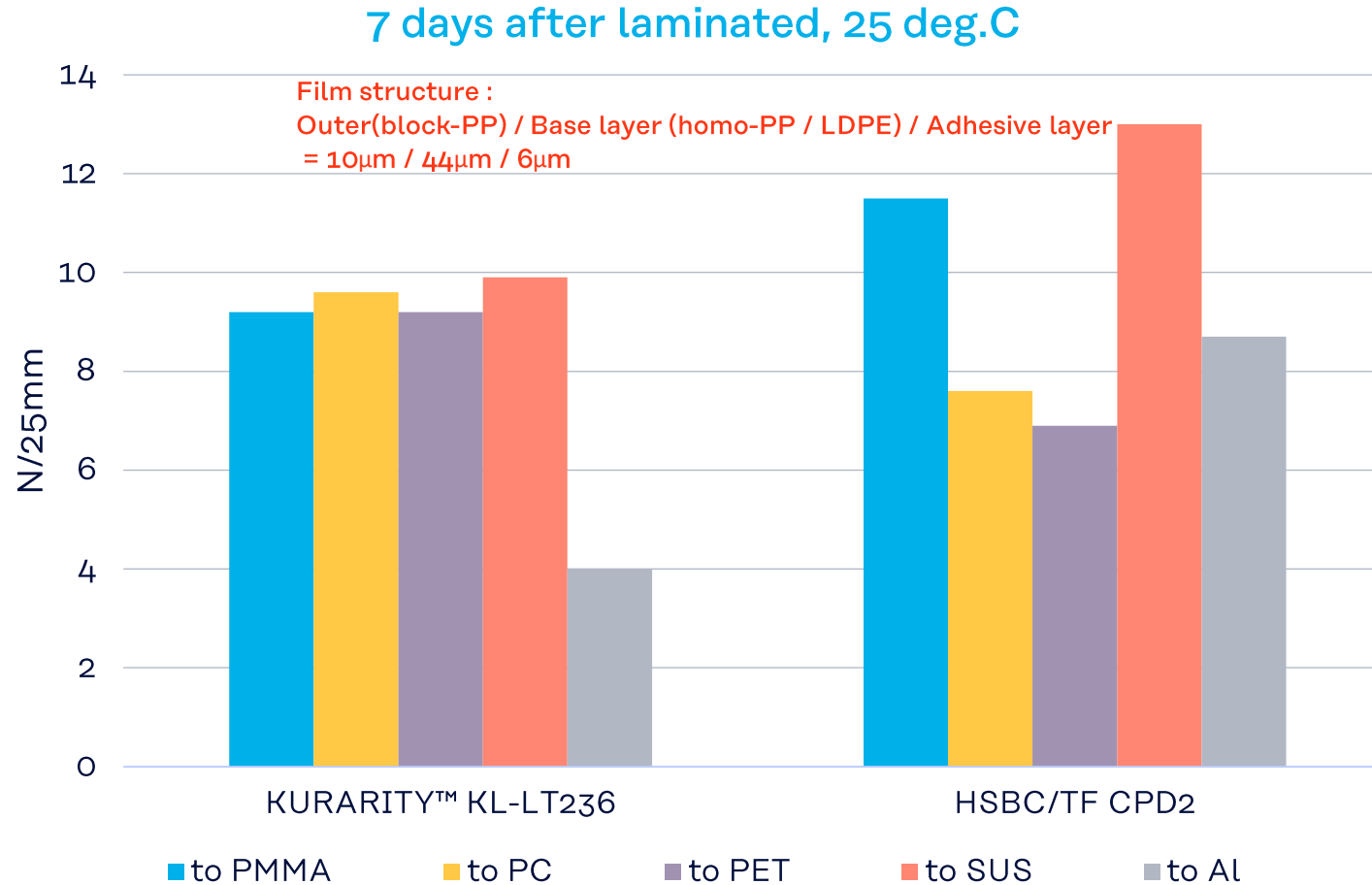
Adhesion properties of KURARITY™ KL-LT236

Adhesive forces to substrates



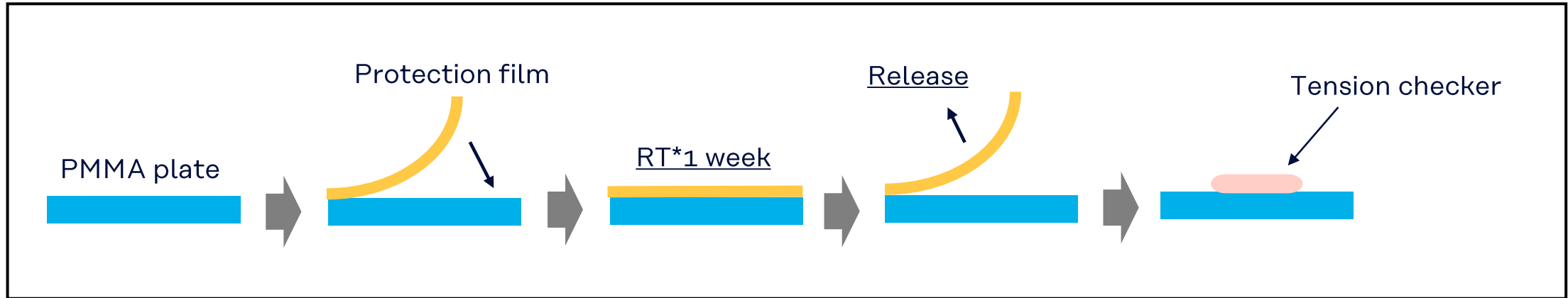
Adhesion properties of KURARITY™ KL-LT236

Adhesive forces to substrates



Residue of adhesives

【Method】 ISO 8296 (Measuring the wetting tension by Tension checker)



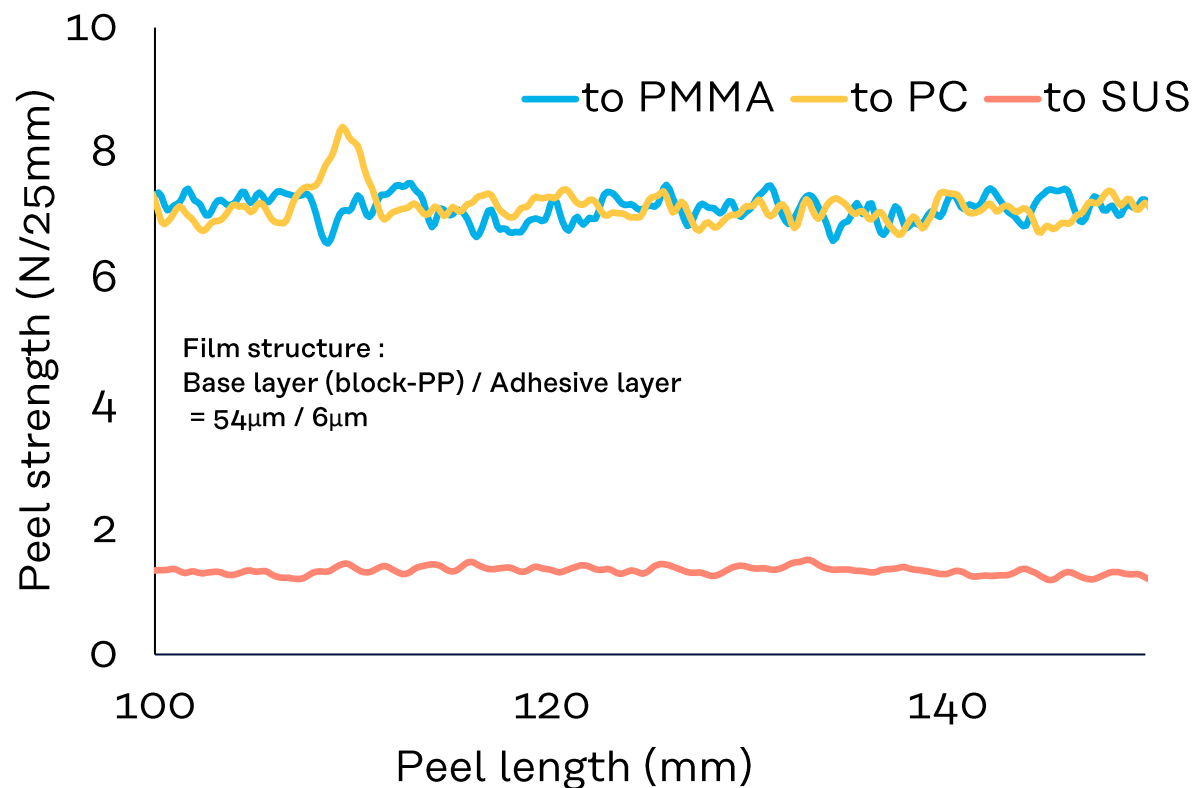
	KURARITY™ KL-LT236	HSBC/TF CPD1
Temperature [deg. C]	23	23
Wetting tension		
Initial [mN/m]	39	39
Final [mN/m]	39	35

- KURARITY™ KL-LT236 can be much cleaner than HSBC / TF CPD1

Adhesion properties of KURARITY™ KL-LT236

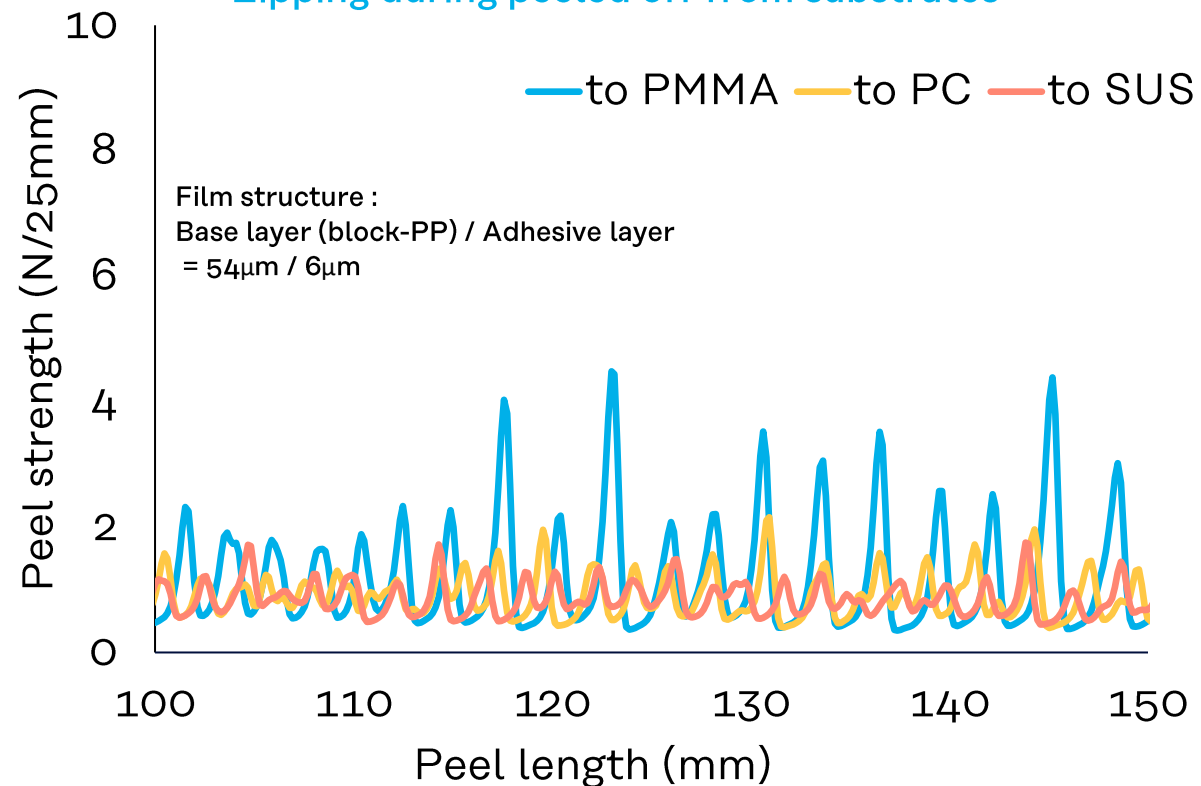
Adhesive force to substrates (Zipping Chart)

KURARITY™ KL-LT236 (25 deg.C×7days)



HSBC / TF CPD2 (25 deg.C×7days)

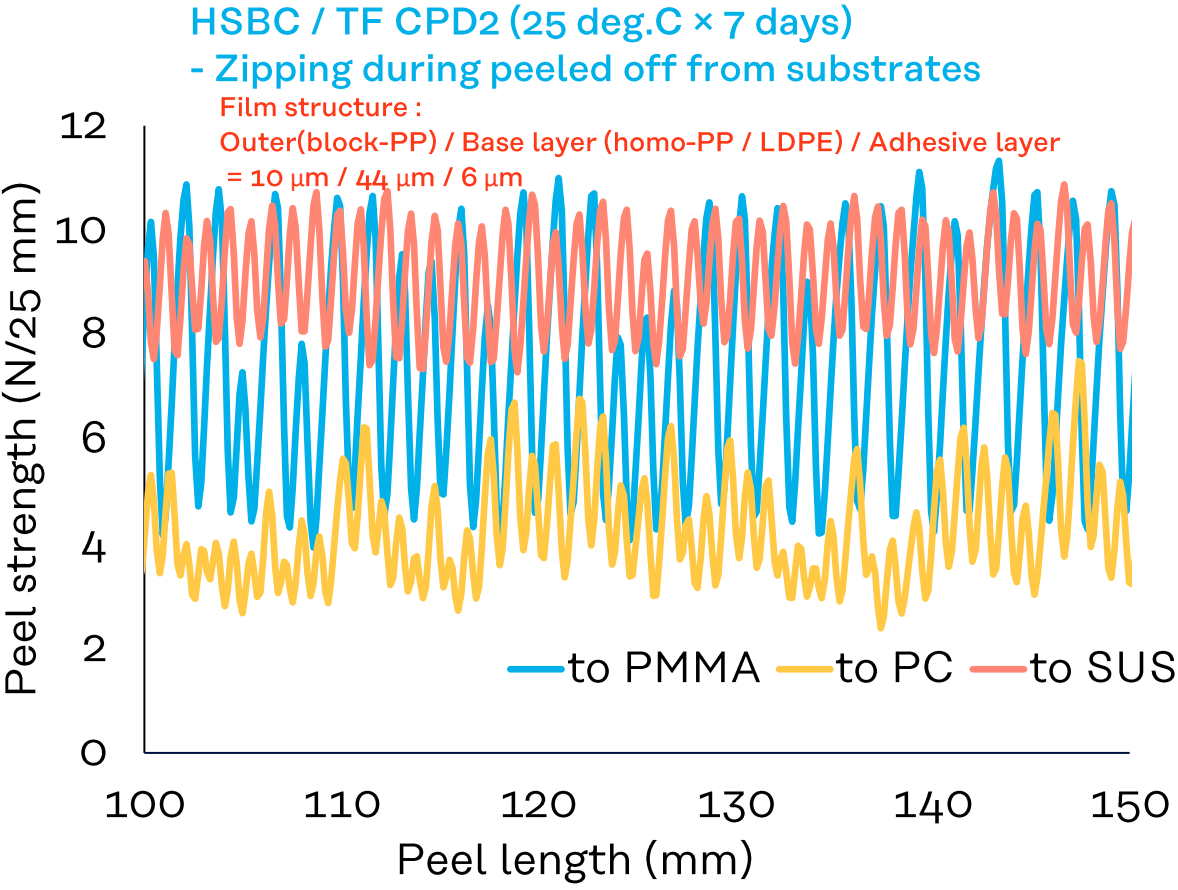
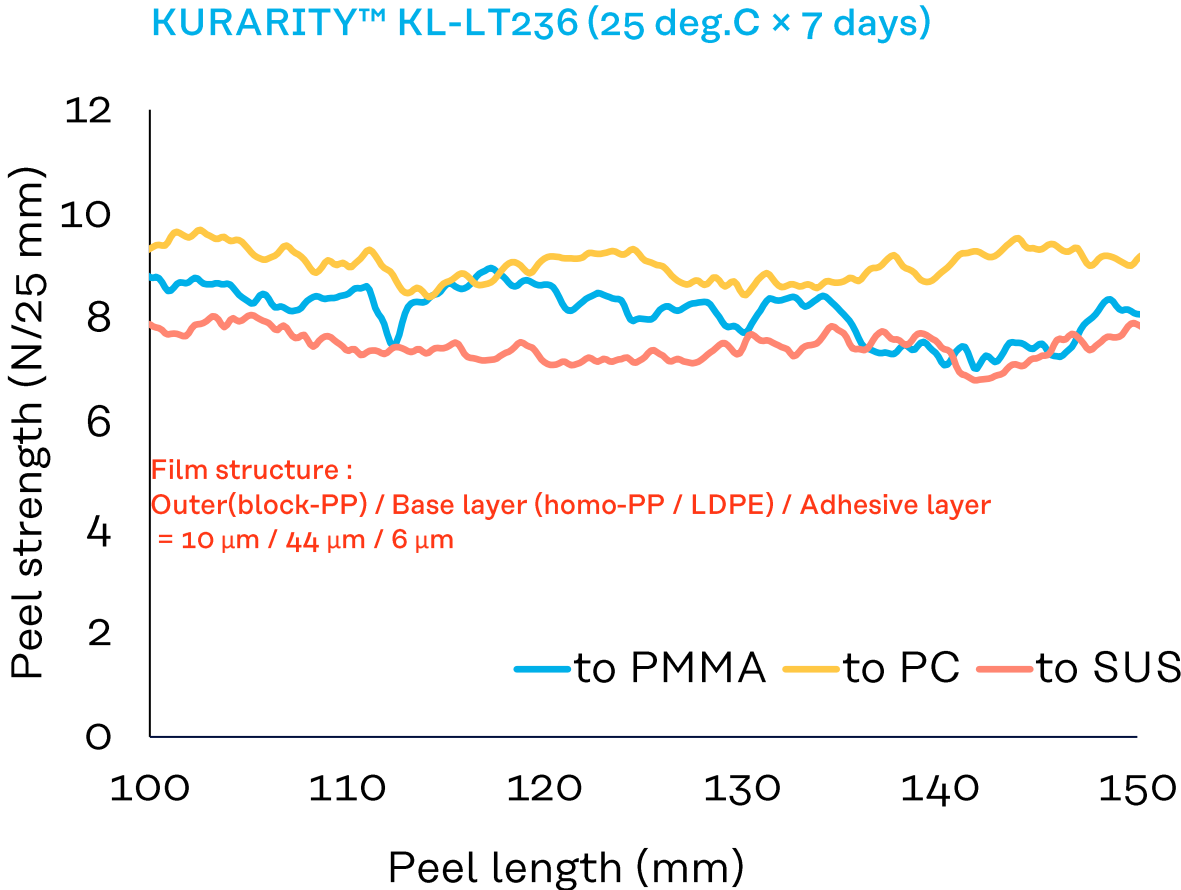
- Zipping during peeled off from substrates



- Smooth peeling off from substrates compared to HSBC / TF CPD2

Adhesion properties of KURARITY™ KL-LT236

Adhesive force to substrates (Zipping Chart)

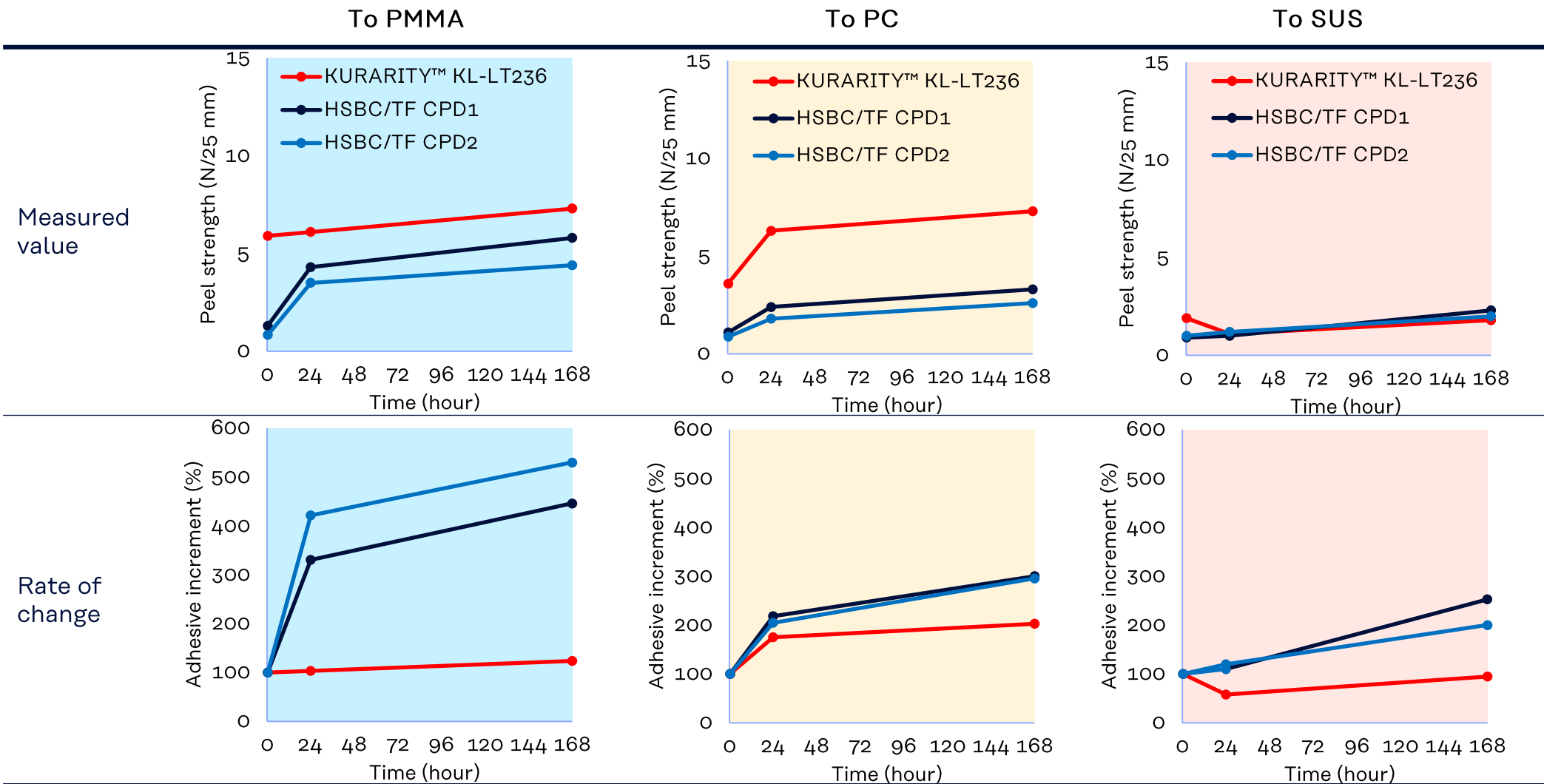


- Smooth peeling off from substrates compared to HSBC / TF CPD2

Adhesion properties of KURARITY™ KL-LT236

Film structure :
 Base layer (block-PP) / Adhesive layer
 = 54μm / 6μm

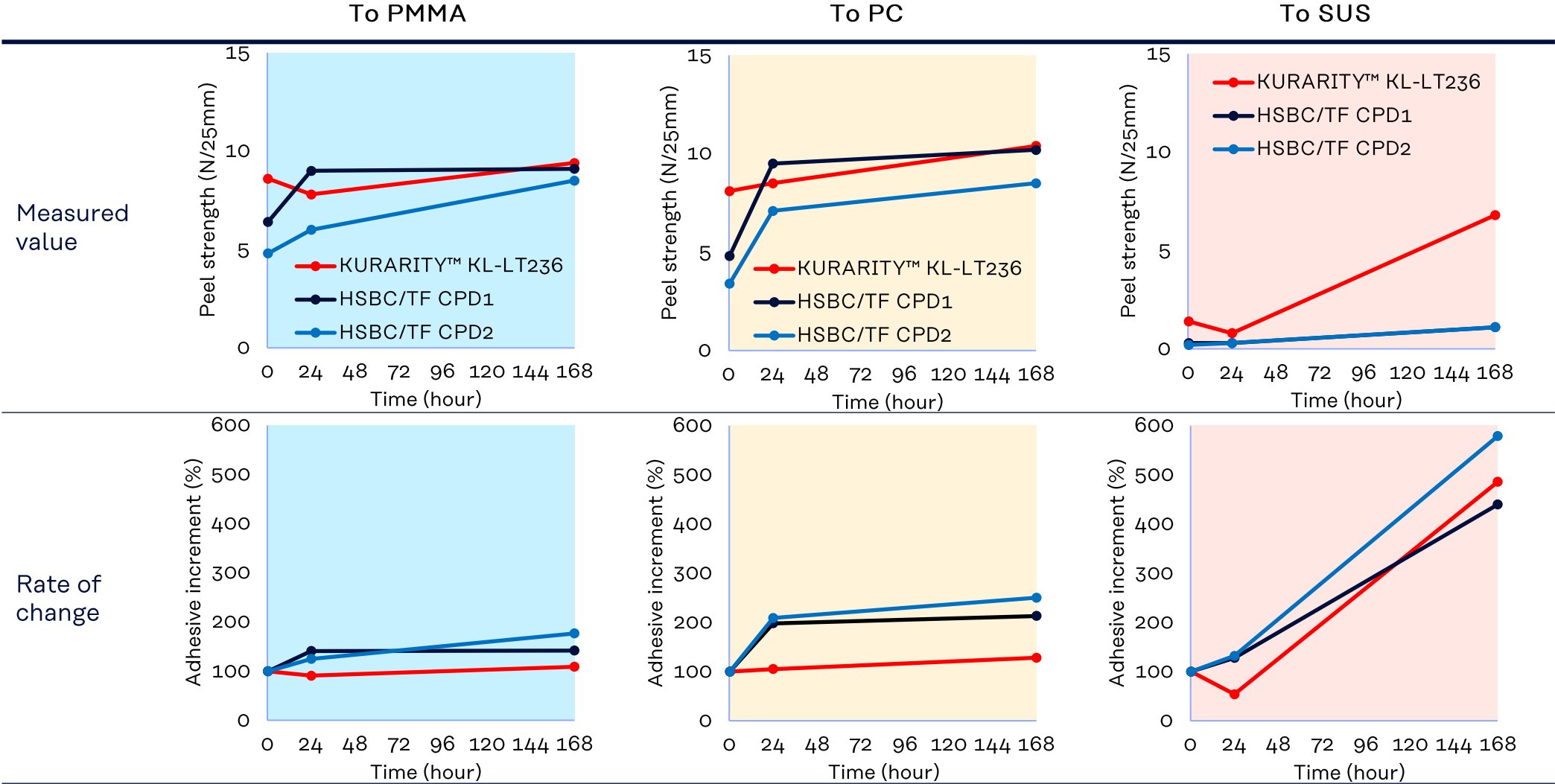
Adhesive increments with time at 25 deg.C



Adhesion properties of KURARITY™ KL-LT236

Film structure :
 Base layer (block-PP) / Adhesive layer
 = 54μm / 6μm

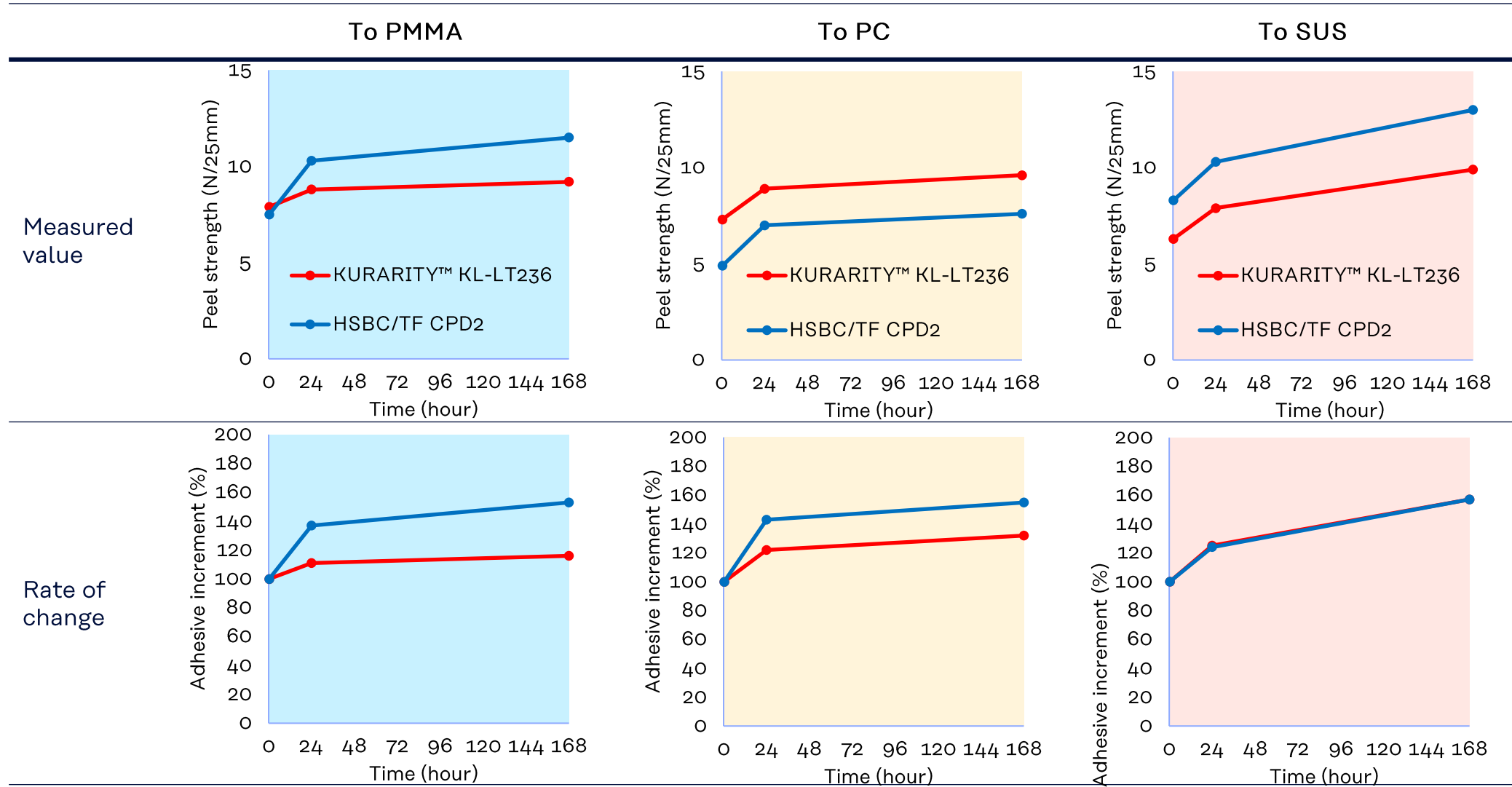
Adhesive increments with time at 60 deg.C



Adhesion properties of KURARITY™ KL-LT236

Film structure :
 Outer (block-PP) / Base layer (homo-PP / LDPE) / Adhesive layer
 = 10μm / 44μm / 6μm

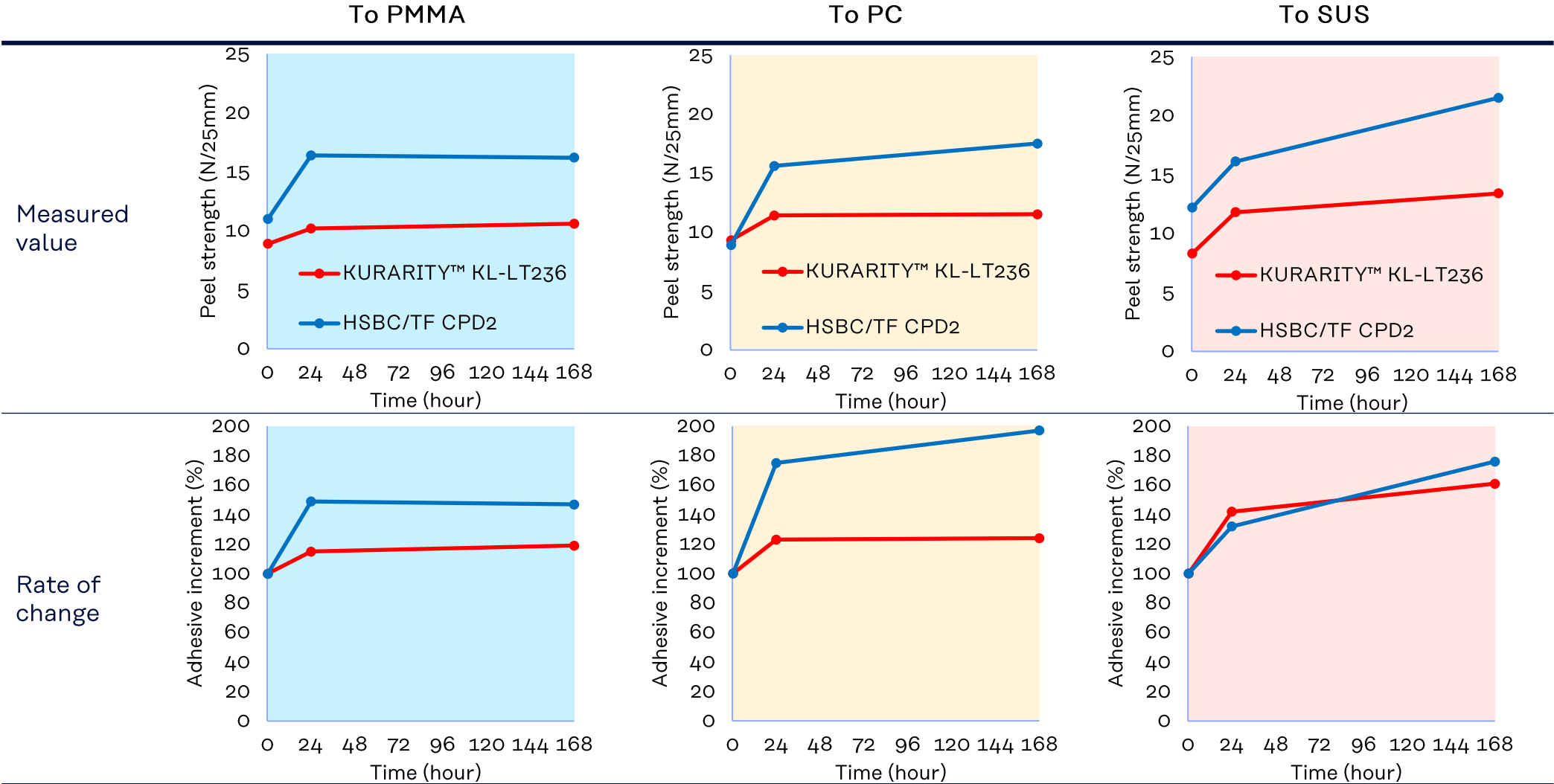
Adhesive increments with time at 25 deg.C



Adhesion properties of KURARITY™ KL-LT236

Film structure :
 Outer (block-PP) / Base layer (homo-PP / LDPE) / Adhesive layer
 = 10μm / 44μm / 6μm

Adhesive increments with time at 60 deg.C



Summary of features (Good points of KURARITY™ KL-LT236)

	KURARITY™ KL-LT236	Conventional HSBC / TF
Excellent adhesion to various substrates	★ ★ ★	★ ★ ★
Smoothly peels off from substrates	★ ★ ★	★
Residue of adhesives	★ ★ ★	★ ★
Adhesion increment	★ ★ ★	★

★ ★ ★ Good >>> ★ Poor

Properties of KURARITY™ KL-LT236

Physical Properties

			KURARITY™ KL-LT236	HSBC / TF CPD1	HSBC / TF CPD2
	Test Method	Units			
MFR	ISO 1133 [190 deg.C*2.16kg]	g/10min	29	4.8*	6.5*
Specific Gravity	ISO 1183	-	0.95	0.94*	0.94*
Hardness	ISO 7619-1 (Type A) After 15sec	-	38	31*	30*
G'@23deg.C		Pa	1.0E+6	6.2E+5	6.3E+5
DMA Tg		deg.C	-39	-23	-18

* Catalog data

Processing Conditions (Co-extrusion, T-die)

		KURARITY™ KL-LT236 (Adhesive)	Base layer (Block type PP*)
Cylinder (deg. C)	The bottom of hopper	100-120	200-210
	Center	160-180	220-230
	Adapter side	160-190	220-240
Adapter (deg. C)		170-190	220-240
Feed-Block Die (deg. C)		220-250	
T-Die (deg. C)		220-250	
Chill roll (deg. C)		20-50	
Pellet drying condition		60 deg.C, 6 hours	-
Cleaning		All traces must be fully purged by PE (MFR** = 7~10)	

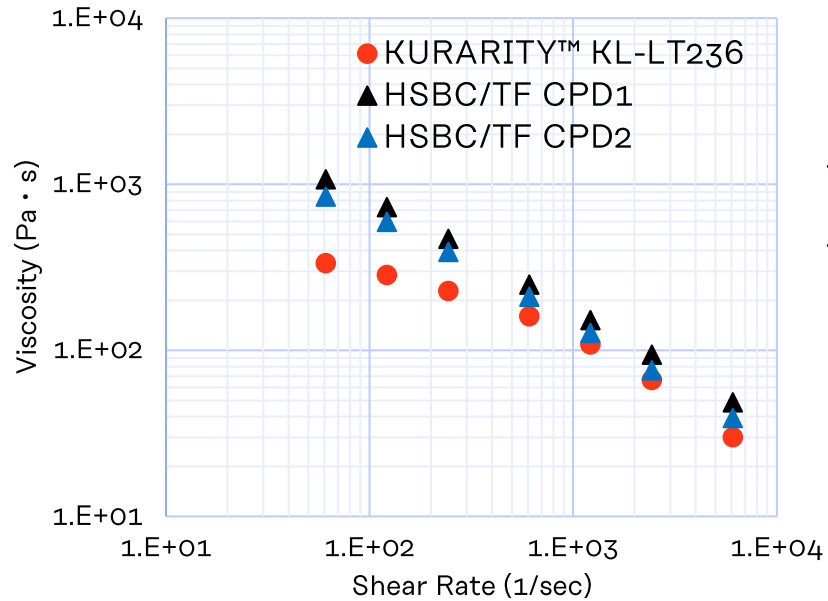
* For example. Sun Allomer Ltd. MFR = 6.0 g / 10 min (230 deg.C, 2.16 kgf)

** MFR condition : 190 deg.C / 2.16 kgf

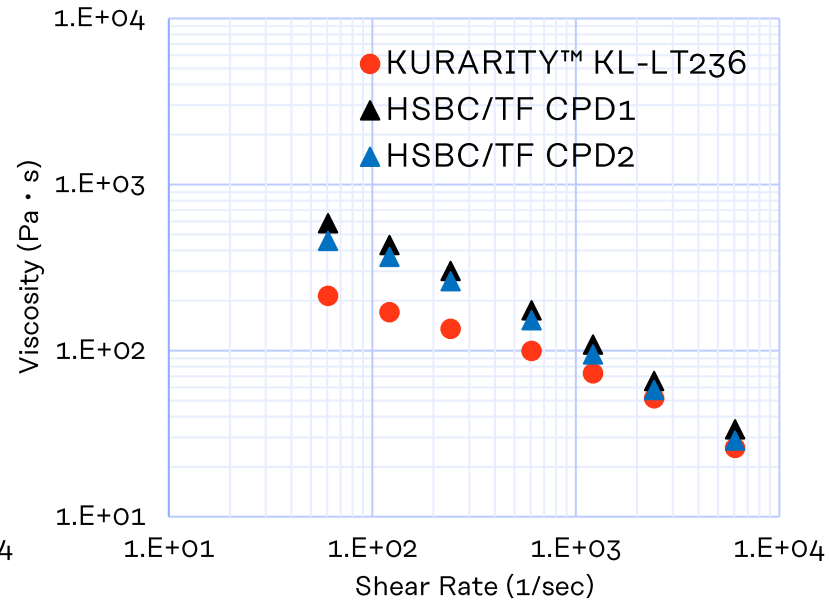
Properties of KURARITY™ KL-LT236

Melt Viscosities

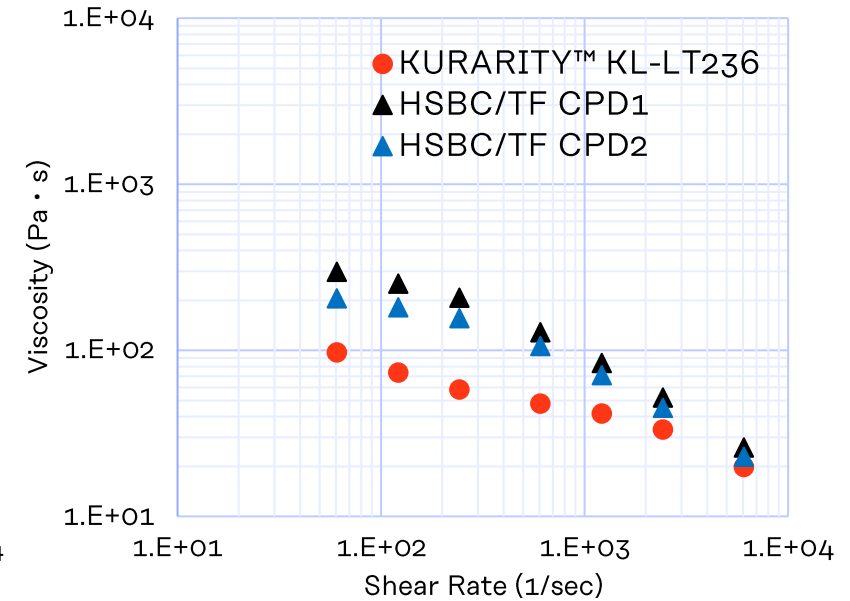
190 deg.C



210 deg.C

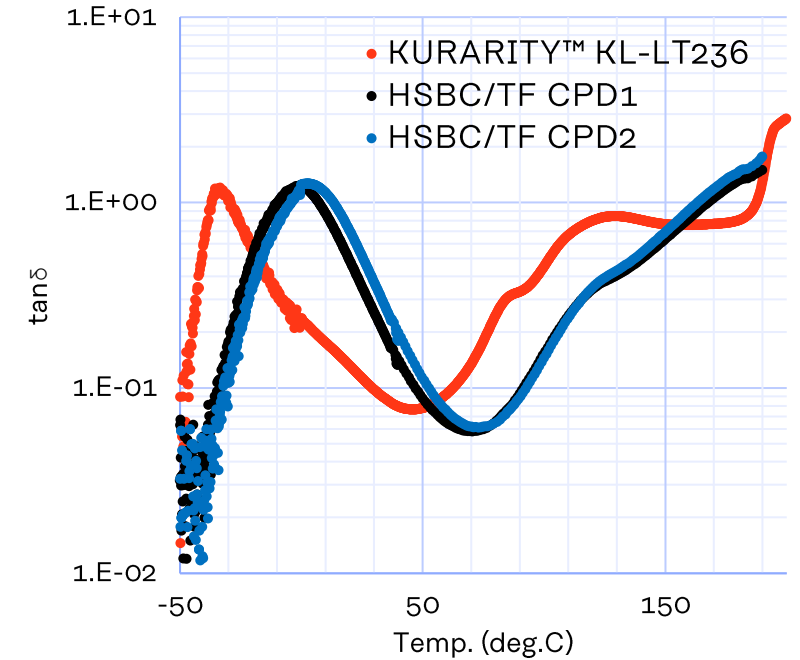
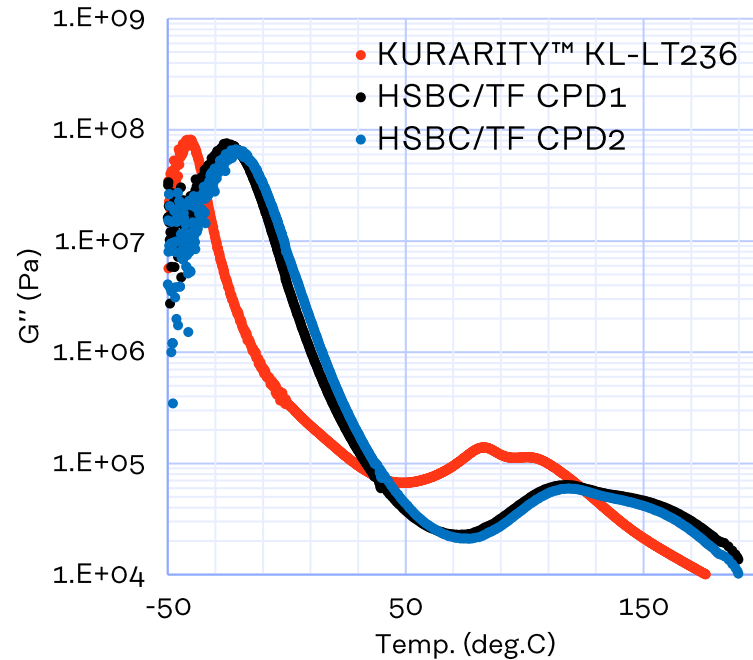
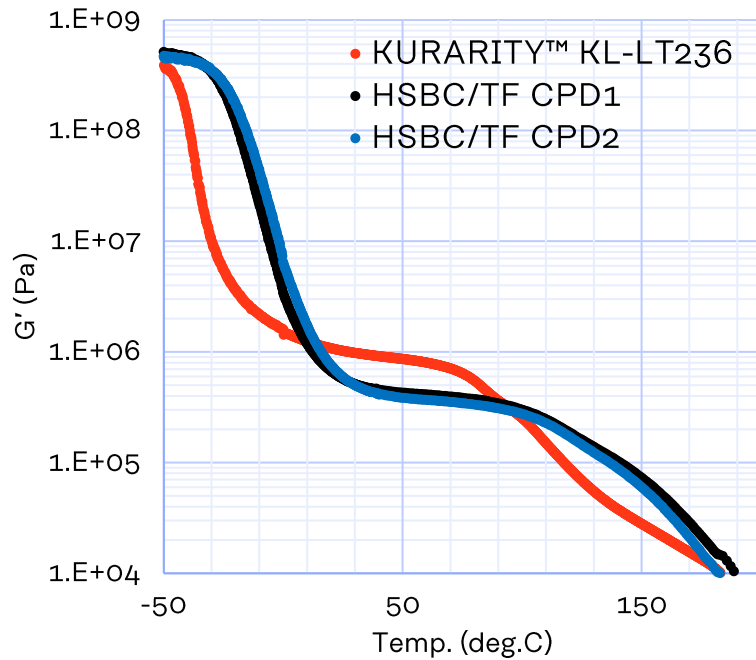


230 deg.C



Properties of KURARITY™ KL-LT236

Dynamic Viscoelasticity (1Hz)



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