Evaluation results of the polymer synthesized at Supplier B
2nd Trial Vol.3

2019.08.01

HDM-190801-MO-01

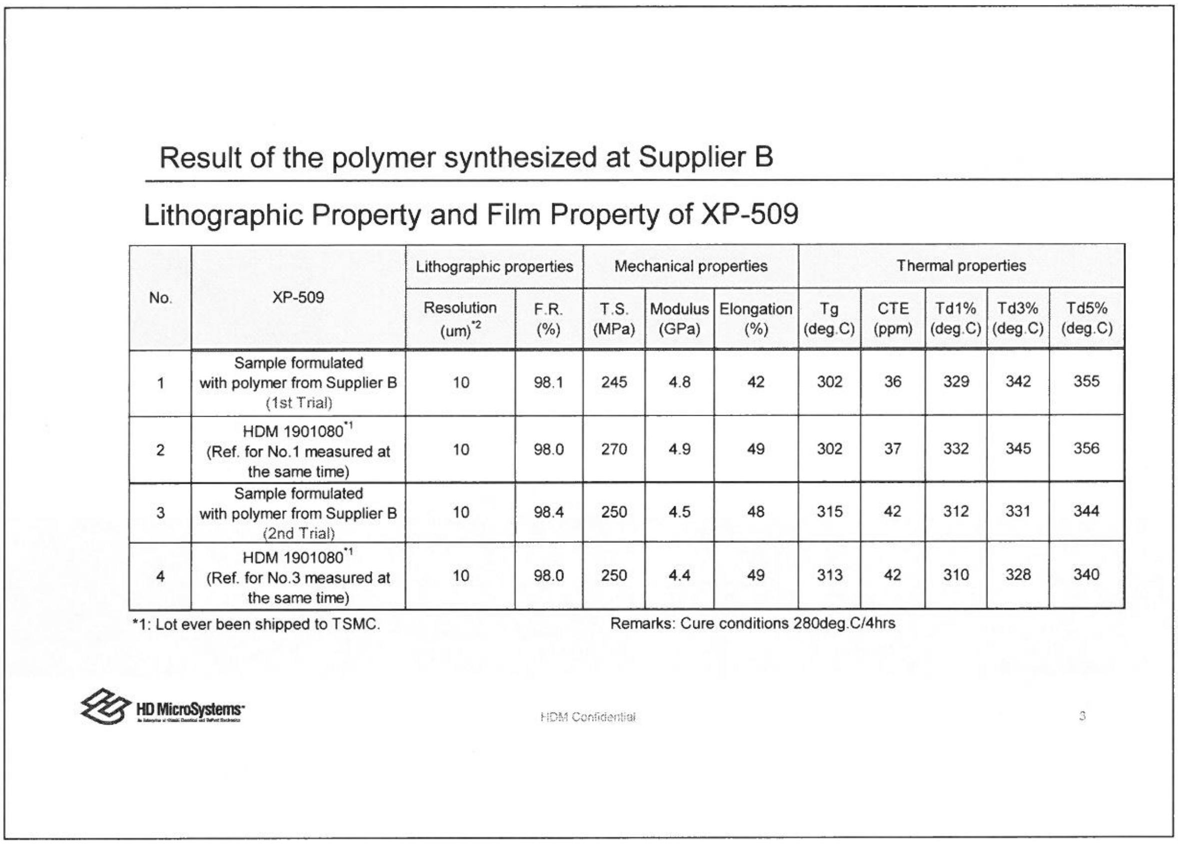
Results of the polymer synthesized at Supplier B

Polymer property

Items	Mw[*1]	Mw/Mn[*1]	%Ester[*2] (%)	Water (%)	Metal impurities (ppm)					
					Na	K	Cu	Fe	Al	Ca
Polymer synthesized at Supplier B (1st trial)	0.99	1.02	97	0.5	0.08	0.06	<0.01	0.18	0.35	0.35
Polymer synthesized at Supplier B (2nd trial)	1.04	0.94	95	0.85[*3]	<0.01	0.02	<0.01	0.09	0.13	0.07
Actual record at HDM	1.00	1.00	>95	<0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2

[*1] The normalized value compared with the polymer synthesized at HDM. And the Mw was measured at the same day for comparison.

[*2] Calculated result from ^{1}H-NMR [*3] Powder might take moisture during handling. Can be reduced by re-drying.



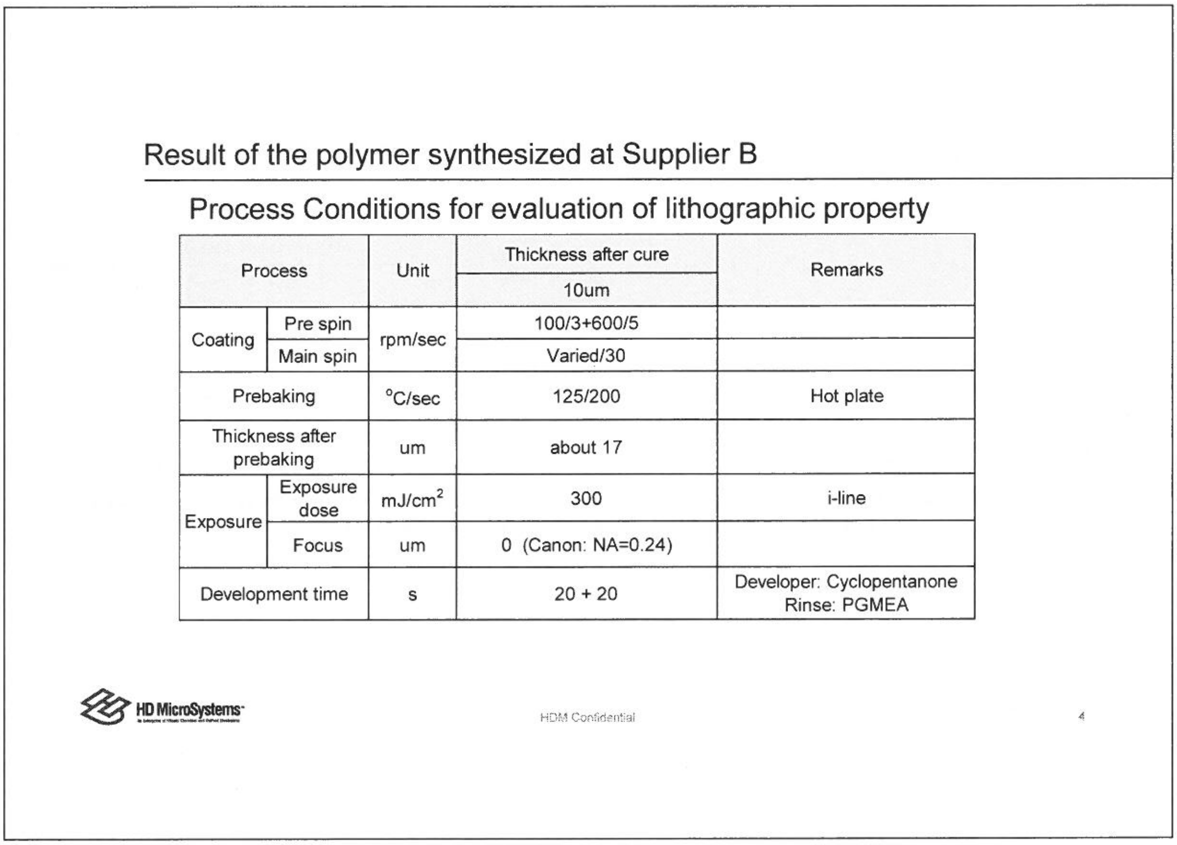
Result of the polymer synthesized at Supplier B

Lithographic Property and Film Property of XP-509

No.	XP-509	Lithographic properties		Mechanical properties			Thermal properties				
		Resolution (um)[*2]	F.R. (%)	T.S. (MPa)	Modulus (GPa)	Elongation (%)	Tg (deg.C)	CTE (ppm)	Td1% (deg.C)	Td3% (deg.C)	Td5% (deg.C)
1	Sample formulated with polymer from Supplier B (1st Trial)	10	98.1	245	4.8	42	302	36	329	342	355
2	HDM 1901080[*1] (Ref. for No.1 measured at the same time)	10	98.0	270	4.9	49	302	37	332	345	356
3	Sample formulated with polymer from Supplier B (2nd Trial)	10	98.4	250	4.5	48	315	42	312	331	344
4	HDM 1901080[*1] (Ref. for No.3 measured at the same time)	10	98.0	250	4.4	49	313	42	310	328	340

*1: Lot ever been shipped to TSMC.

Remarks: Cure conditions 280deg.C/4hrs



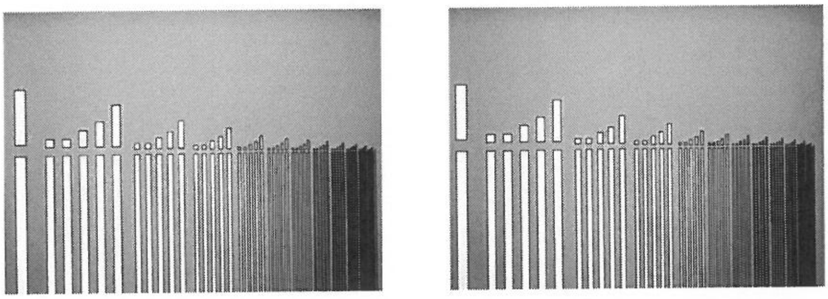
Result of the polymer synthesized at Supplier B

Process Conditions for evaluation of lithographic property

Process		Unit	Thickness after cure	Remarks
			10um	
Coating	Pre spin	rpm/sec	100/3+600/5	
	Main spin		Varied/30	
Prebaking		°C/sec	125/200	Hot plate
Thickness after prebaking		um	about 17	
Exposure	Exposure dose	mJ/cm^2	300	i-line
	Focus	um	0 (Canon: NA=0.24)	
Development time		s	20 + 20	Developer: Cyclopentanone Rinse: PGMEA

Result of the polymer synthesized at Supplier B

OM Images of pattern after deve.



Supplier B 2nd trial

Ref. HDM 1901080