

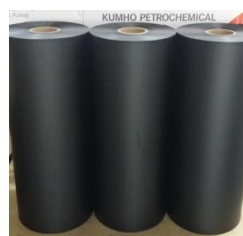
HIPS/CNT Composites

◆ Characteristics

- HIPS / CNT composite materials can be used in various fields
 - ▷ Module trays for transporting electronic and automotive parts, carrier tape, bobbin (reel), etc.
- With its minimized conductive filler content compared to that of CB(Carbon Black) based compound products, it does not inhibit compounded resin-specific properties
 - ▷ CB content of CB compound. : Approx. 20~30%
 - ▷ CNT content of CNT compound. : Approx. 2~3%(Approx. Ten fold difference)
 - ▷ The less additives, the more free of particles/dusts/sloughing
- When producing sheet and tray, physical property of resin is well maintained without breaking, and formability and deformability are excellent.
 - ▷ Compound products with high content of mineral fillers such as CB inhibit resin-specific properties which lead to easy breaking when producing sheet and tray.

◆ Applications

Grade	Surface Resistance (Ω/sq.)	Applications
EHI110	10 ⁴ ~10 ⁶	Sheets, Thermoformed trays, Carrier tape
EHI210	10 ⁶ ~10 ⁹	
EHI310	10 ⁵ ~10 ⁶	
EHI120	10 ⁵ ~10 ⁹	Reels, Boxes
MHI150	N/A	Sheets



[HIPS sheet]



[Module tray]



[Carrier tape]



[Reel]

◆ Typical Properties

Properties	ASTM	Condition	EH110	EHI210	EHI310	EHI120	MHI150
Specific Gravity	D792		1.04	1.04	1.04	1.083	1.04
Melt Flow Index	D1238	200°C/5kg	3	3.8	3	3	5
Tensile Strength(kgf/cm ²)	D638	50mm/min	230	220	240	230	240
Tensile Elongation at Break(%)	D638	50mm/min	30	70	35	30	50
Flexural Strength(kgf/cm ²)	D790	10mm/min	320	310	330	350	300
Flexural Modulus(kgf/cm ²)	D790	10mm/min	19900	18500	19800	21100	17500
Izod Impact, Notched(kgf-cm/cm)	D256	(notched) 3.2mm	7	8	7	6	10
Rockwell Hardness	D785	L-scale	54	49	52	69	60
Heat Deflection Temperature(°C)	D648	18.6kg/cm ²	74	76	73	75	74
Surface Resistivity (E+Ω/sq)	D257	at 23°C, 50% RH (@ Haake sheet)	4~5	5~6	5~6	~	~
		at 23°C, 50% RH (1.6mm specimen)	~	~	~	5~6	~

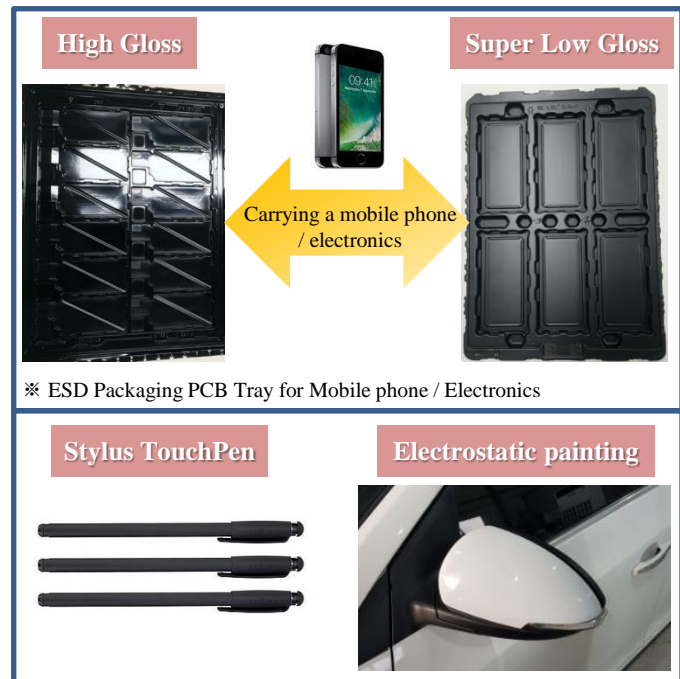
ABS/CNT Composites

◆ Characteristics

- ABS/CNT Composite materials can be applied in both conductive and non-conductive applications.
 - ▷ Module tray for electronic parts, Electrostatic spray painting, Housings and cases with high rigidity.
- MAB150 Series are mainly applied to conductive extrusion sheet for coating type.
- The products coated in conductive solution have increased adhesion, mechanical strength and abrasion resistance.
 - ▷ MAB150 is excellent in gloss and surface quality and MAB150M is outstanding in recognition rate of laser marking.
- Electro-conductivity is revealed by the addition of CNT to ABS
 - ▷ EAB120 can be processed by the non-painting and increase painting efficiency with uniform conductivity

◆ Applications

Grade	S.R. ($\Omega/\text{sq.}$)	Applications
EAG210	$10^5 \sim 10^7$	Stylus Pen, High strength parts
EAB110	$10^4 \sim 10^6$	Sheets, Thermoformed trays
EAB120	$10^8 \sim 10^{10}$	Electrostatic painting parts, Boxes
MAB150	N/A	Sheets, Thermoformed trays, Pipes
MAB150M	N/A	
MAB150C	N/A	
MAB150I	N/A	Technical parts, Case



◆ Typical Properties

Properties	ASTM	Test Condition	EAG210	EAB110	EAB120	MAB150	MAB150 M	MAB150 C	MAB150I
Specific Gravity	D792		1.06	1.08	1.05	1.06	1.04	1.06	1.05
Melt Flow Index (g/10min)	D1238	220°C/10kg	15	2	9	27	30	7	30
Tensile Strength(kgf/cm ²)	D638	50mm/min	840	530	470	485	245	513	500
Tensile Elongation at Break(%)	D638	50mm/min	5	9	30	10	30	10	20
Flexural Strength(kgf/cm ²)	D790	10mm/min	1,050	720	650	670	320	700	680
Flexural Modulus(kgf/cm ²)	D790	10mm/min	55,000	28,000	22,100	23,400	14,000	24,000	21,500
Izod Impact, Notched (kgf-cm/cm)	D256	(notched) 3.2mm	4	3	10	14	5	19	18
Rockwell Hardness	D785	R-scale	110	110	105	111	81	110	109
Heat Deflection Temperature(°C)	D648	18.6kg/cm ²	95	90	95	91	85	90	87
		at 23°C, 50% RH (@ Haake sheet)		4~6		~	~	~	~

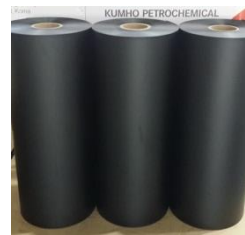
Polyolefin/CNT composites

◆ Characteristics

- Polyolefin/CNT composites can be used in various fields
 - ▷ Module trays for electronic parts transport, Foams for LCD parts transport, Films for agricultural mulching
- Unlike polyolefin/carbon black (CB) composites, polyolefin/CNT composites can secure the specific properties of the base resins due to minimized fillers content.
 - ▷ CB content of polyolefin/CB composites : Approx. 20~30wt%
 - ▷ CNT content of polyolefin/CNT composites. : Approx. 2~3% (Approx. Ten fold difference)
- Polyolefin/CNT composites can be processed into sheets films, and foams with superior electrical properties.
- In case of films for agricultural mulching filed, the specific functions such as the increase of soil temperature or suppress of weeds can be expected.

◆ Applications

Grade	SR (Ω/sq.)	Applications
EPP110	$10^4 \sim 10^6$	Sheets, Thermoformed trays,
EPP210	$10^5 \sim 10^6$	Foams (EPP)
EPE110	$10^6 \sim 10^9$	Films
MPE130	N/A	Agricultural films



[Conductive PP sheet]



[Agricultural PE film]



[Conductive EPP]

◆ Typical Properties

Properties	ASTM	Condition	EPP110	EPP210	EPE110	MPE130
Specific Gravity	D792		1.09	0.95	1.06	0.92
Melt Flow Index	D1238	200°C/5kg	6.9	6.0	-	-
		200°C/10kg	-	-	3.3	19.0
Tensile Strength(kgf/cm ²)	D638	50mm/min	170	270	250	80
Tensile Elongation at Break(%)	D638	50mm/min	20	200	20	> 200
Flexural Strength(kgf/cm ²)	D790	5mm/min	200	260	210	70
Flexural Modulus(kgf/cm ²)	D790	5mm/min	10,300	9,500	9,000	1,900
Izod Impact, Notched(kgf-cm/cm)	D256	(notched) 3.2mm	60	6	20	45
Rockwell Hardness	D785	L-scale	-	-	-	-
Heat Deflection Temperature(°C)	D648	4.6kg/cm ²	82	89	75	58
Surface Resistivity (E+Ω/sq)	D257	at 23°C, 50% RH (1.6mm specimen)	3~4	5~6	5~6	> 14

Engineering Plastic Composite

◆ Characteristics

- It can be applied to various fields as a conductive composite material using PC, PC/ABS, PBT, PA, etc.
 - ▷ IC tray, ATM parts, carrier tape, FOUP, casters, TV bezel, etc.
- With its minimized conductive filler content compared to that of CB(Carbon Black) based compound products, it does not inhibit compounded resin-specific properties
 - ▷ CB content of CB compound. : Approx. 20~30%
 - ▷ CNT content of CNT compound. : Approx. 2~3%(Approx. Ten fold difference)
- Optimum compound can be provided by CNT dispersion and base material suitable to customer requirements
 - ▷ Dimensional stability, strength characteristics, gloss control, excellent heat distortion characteristics, etc.

◆ Applications

Grade	SR (Ω/sq.)	Applications
EPG111	10 ⁵ ~10 ⁷	Technical parts, Case, Bezel
EPG210	10 ⁵ ~10 ⁹	ATM Part
EPC210	10 ⁴ ~10 ⁶	Sheets, Thermoformed trays,
EPC220	10 ⁶ ~10 ⁸	IC Trays



[Conductive tray]



[Carrier tape]



[FOUP]



[TV Bezel]

◆ Typical Properties

Properties	ASTM	Condition	EPG111	EPG210	EPC210	EPC220
Specific Gravity	D792		1.26	1.33	1.2	1.2
Melt Flow Index	D1238	260°C/5kg	22			
		280°C/5kg			9.5	
		300°C/2.16kg		12		6
Tensile Strength(kgf/cm ²)	D638		825	1,120	690	654
Tensile Elongation at Break(%)	D638		11	6	30	140
Flexural Strength(kgf/cm ²)	D790		1,120	1,535	960	860
Flexural Modulus(kgf/cm ²)	D790		36,700	55,924	26,000	22,560
Izod Impact, Notched(kgf-cm/cm)	D256	(notched) 3.2mm	12	12	7	20
		(notched) 6.4mm	10			
Rockwell Hardness	D785	R-scale	118	120	-	122
Heat Deflection Temperature(°C)	D648	18.6kg/cm ²	94	135	-	134
Flamability	UL94	1/16"(1.6mm)	V-1	HB	HB	HB
Surface Resistivity (E+Ω/sq)	D257	at 23°C, 50% RH	5~7	5~9	4~5	6~8



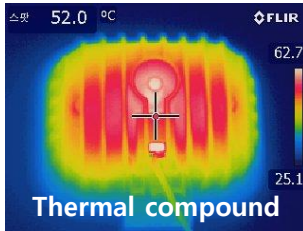
Heat dissipation/Electro-Magnetic Interference Shielding Composite

◆ Characteristics

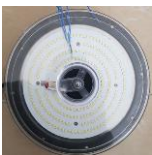



- Demand for high heat sink/EMI shield effectiveness according to increased electrical device
 - ▷ Lamp/ECU/HPCU/Wireless charger housing and the front and back Radar of vehicle, etc
- Character of conductive plastics
 - ▷ Compounds represent similar heat sink property compared to Al die-casting products
 - ▷ EMI Shielding effectiveness can be adjustable in specific frequency band
 - ▷ Compounds have superior Light-weight and compactibility compared to metal
(About 40~55% weight reduction is available)

◆ Applications

Heat dissipation compounds

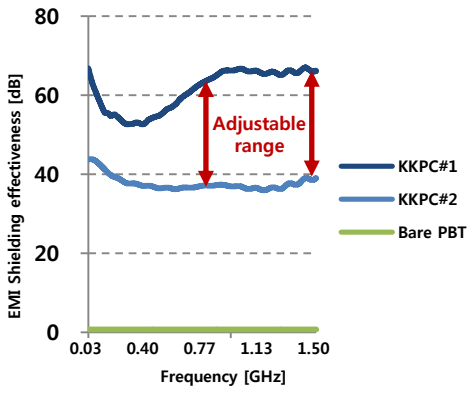




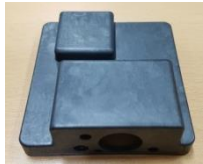

Item	The back side	LED OFF	LED ON 15min	ΔT
Housing by Al die-casting	Cover temp.	23.2	49	25.8
Housing by thermal compound	Cover temp.	23.2	52	28.8

[Application of heat dissipation plastics]

EMI Shielding compounds



[Housing for blackbox] [Shark-Antenna]

◆ Typical Properties

Properties	ASTM	Condition	Heat dissipation			EMI Shield
			TPB110 (non-dielectric)	TPA110 (non-dielectric)	TBN110 (dielectric)	SPB110
Specific Gravity	D792		1.58	1.53	1.8	1.52
Tensile Strength(kgf/cm ²)	D638	5mm/min	400	755	700	400
Flexural Strength(kgf/cm ²)	D790	5mm/min	460	1,220	500	700
Flexural Modulus(kgf/cm ²)	D790	5mm/min	105,000	195,000	10,000	70,000
Izod Impact, Notched(kgf-cm/cm)	D256	(notched) 3.2mm	3.6	3.8	2.8	3.0
Thermal conductivity(W/m·K)	D5470		>10	>10	>5	<10
EMI Shield(dB)	D4935	3.2mm, 1GHz	-	-	-	60~65