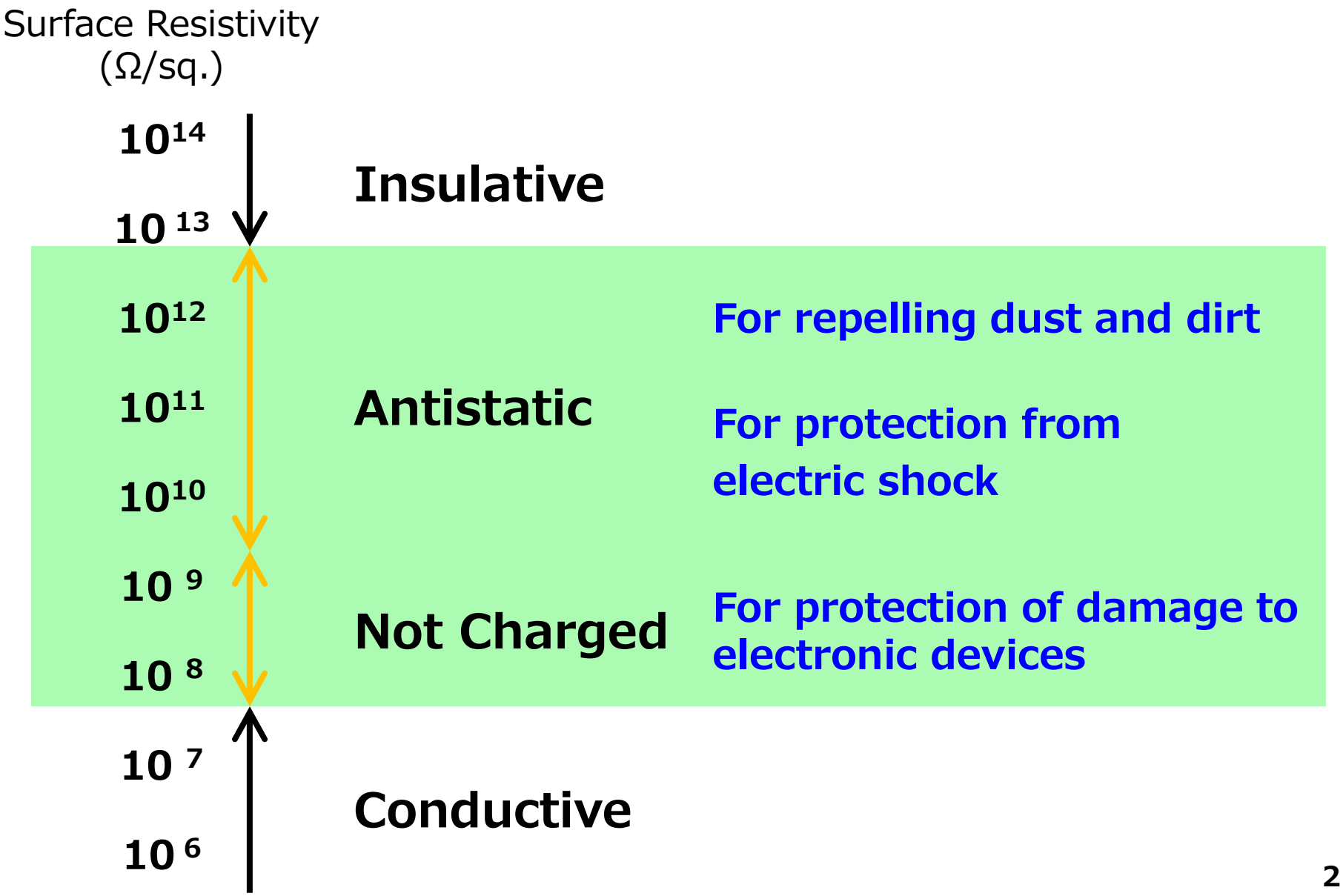
Permanent Antistatic Additives
PELESTAT/PELECTRON

PELECTRON/PELESTAT impart permanent antistatic properties to resins such as ABS, PP, and PE.

<Features>

- **✓ Due to it's good dispersivility to base resins, it doesn't affect physical properties and moldability of base resins.**
- **✓ Humidity independence.**
- **✓ Superior Cleanness (Non bleeding out type).**
- **✓ Can lower surface resistivity to 10^8-10^9 [Ω/sq.] level. (in case of PELECTRON)**

Purpose to Prevent Static Charge



Application

■ Repelling dust and dirt

（Surface Resistivity ：10^{12} (Ω／sq.)）

＜ For electric appliances, automobile interior component ＞

Dust box of cleaner
Base resin ：transparent-ABS
(Injection molding)

Components of air conditioners
Base resin ：HIPS
(Injection molding)

■ Protection from electric shock

（ Surface Resistivity ： 10^{10}～10^{11} (Ω／ｓｑ．)）

<For explosion-proof products>

Explosion-proof helmet
Base resin ：PP（Injection molding)

Flexible container (Inner bag)
Base resin ：PE（blow molding)

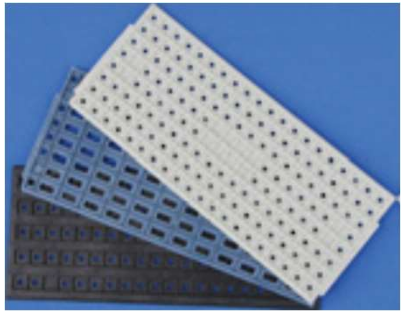
Explosion-proof flashlight
Base resin ：PA（Injection molding)

■Protection of damage to electronic devices

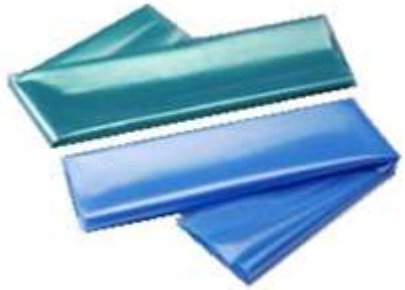
（Surface Resistivity ：１０^{8}～１０^{9}（Ω／ｓｑ．））

<For electronic parts package>

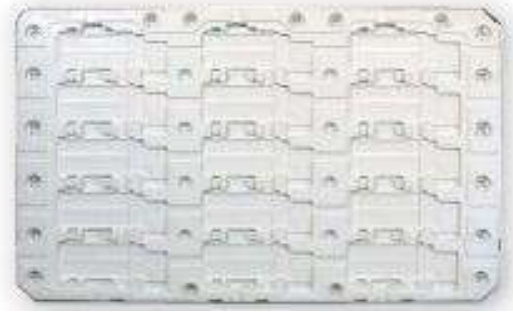
Tray for IC chips , precision parts
Base resin ：ABS, PP, m-PPE
(Injection molding)



Package for electronic parts, precision parts
Base resin ：PE（blow molding)



LCD tray
Base resin ：PP
(extrusion molding→vaccum molding)



Antistatic Effect

Without PELECTRON

After molding

With PELECTRON

Surface Resistivity : 10^{16} Ω/sq.

Surface Resistivity: 10^{12} Ω/sq.

Kept in a room for 3 months

Repelling dust and dirt because of low surface resistivity

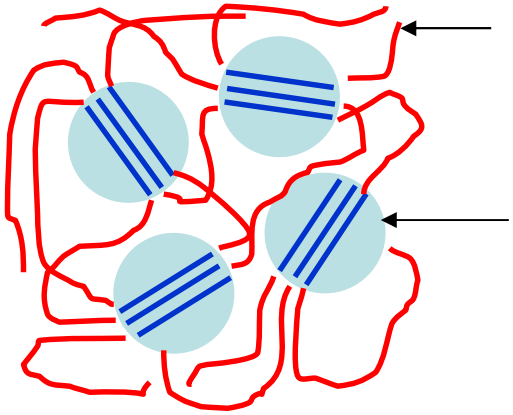
Basic Structure of PELECTRON/PELESTAT

$$\left\{ \text{(PEO Segment)} - \text{(Hard segment)} \right\}_n$$

Antistatic property (Soft segment)

- **Dispersibility to the resin**
- **Maintain mechanical properties to resins (PP / 6Ny / 12Ny)**

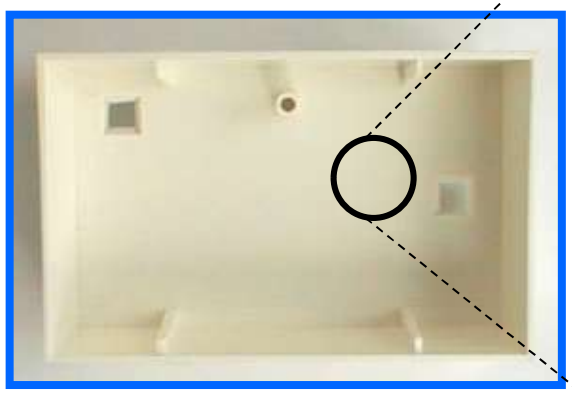
Mw=ca.40,000



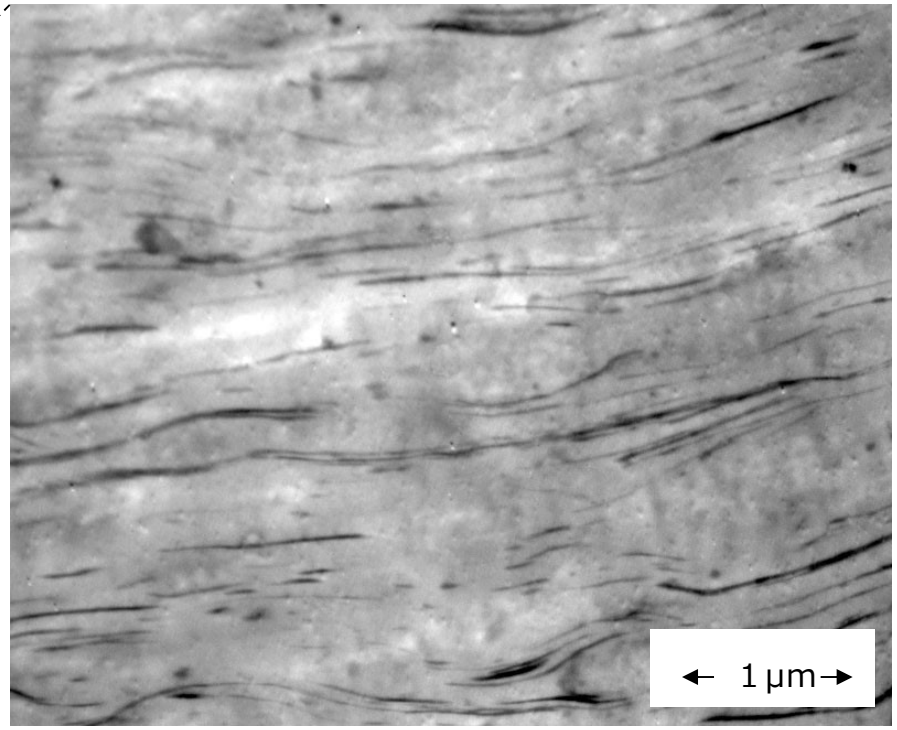
Soft segment
Antistatic properties based on continuous phase of Polyether.

Hard segment
Elastomeric properties based on cohesive power of hard segment.

Morphology

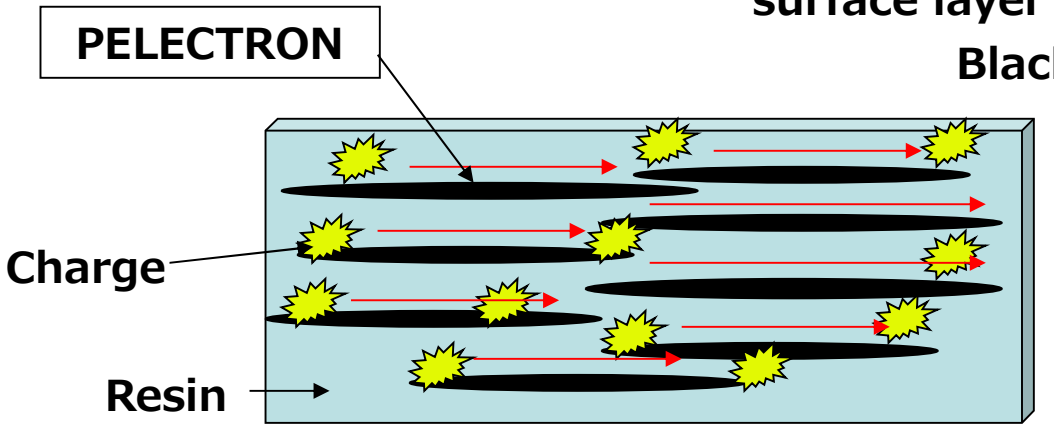


HIPS resin / PELECTRON (3 wt %)



Transmission Electron Microscope (TEM) image of surface layer obtained by injection molding.

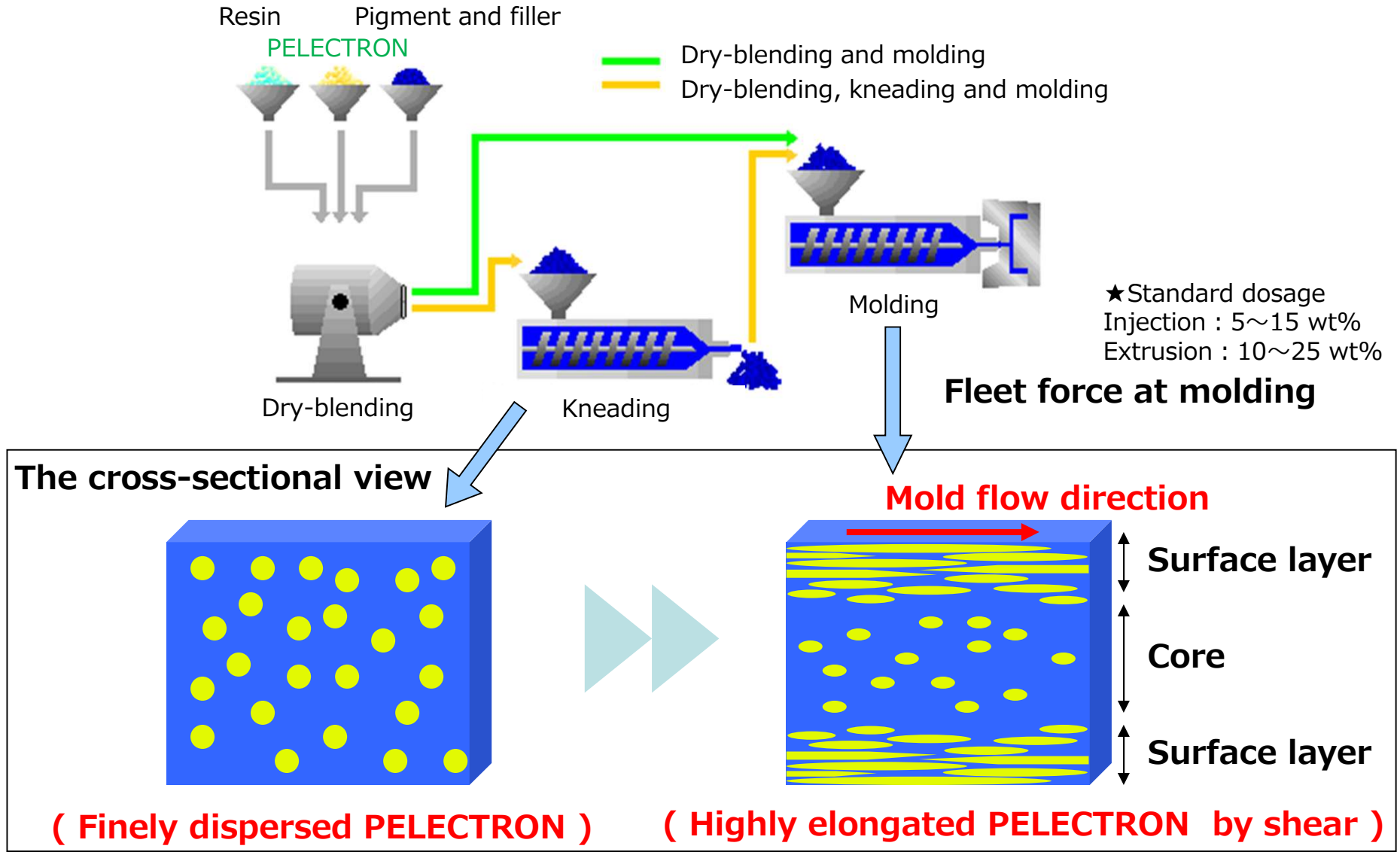
Black stripes: PELECTRON



PELECTRON forms streaky conductive networks in the surface layer of molded piece .

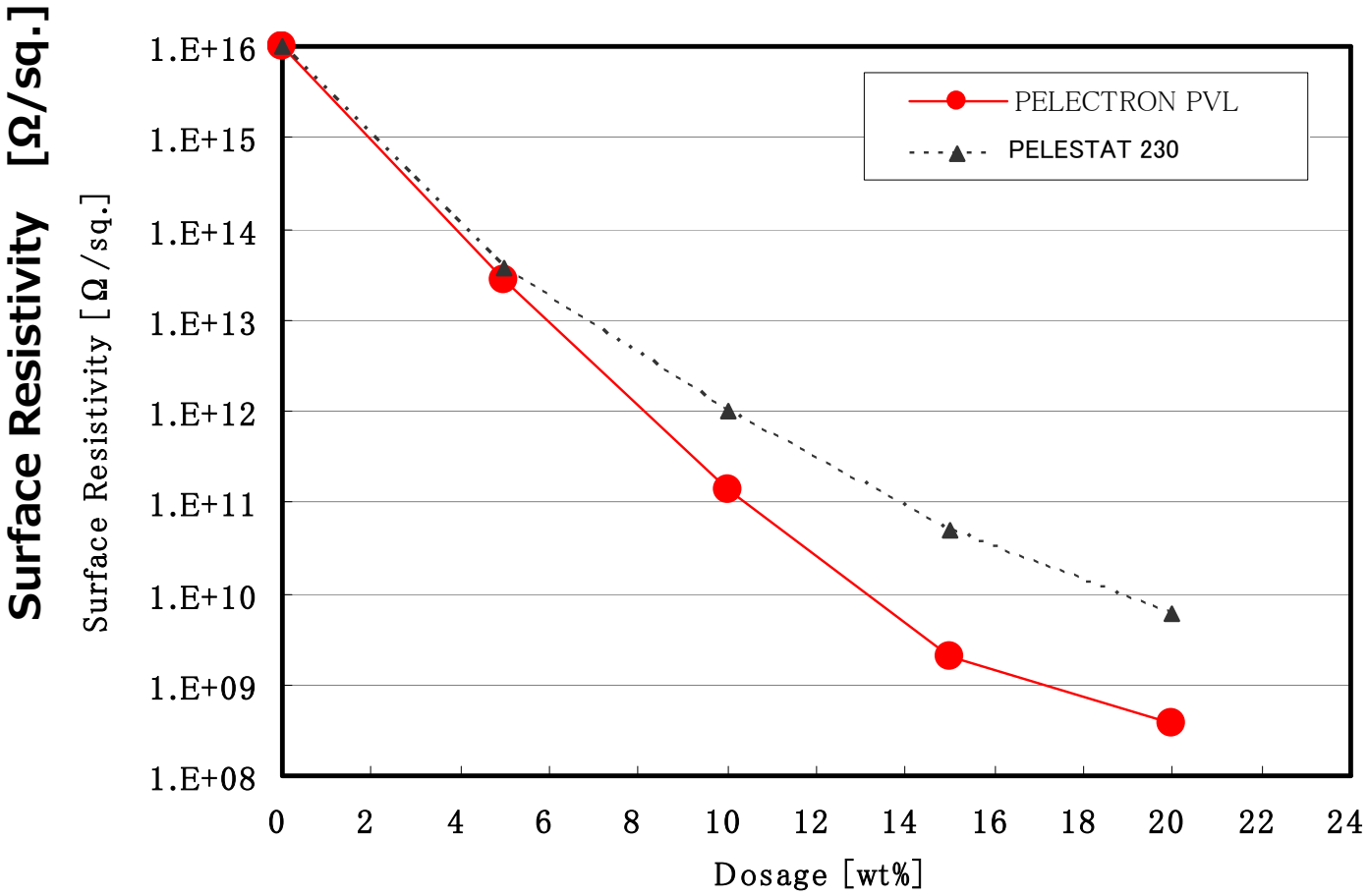
Processing Flowchart

Normal molding method (Injection, Extrusion, etc.)



Surface Resistivity performance

<Example of the application to LDPE extruded film>



Effects on Physical Properties of Resin

Item		Measuring method	LDPE/PELECTRON PVL=90/10	LDPE
Surface Resistivity[1)]	Ω/sq.	ASTM D 257	1×10^{11}	$>10^{16}$
MFR(190℃, 21.18N)	g/10min	ASTM D 1238	3	2
Tensile strength	MPa	ASTM D 638	21	20
Tensile strength at break	%	ASTM D638	590	580
Haze	%	JIS K 7105	35	34
Total light transmittance	%	JIS K 7105	86	86

1) 23℃(73°F), 50% R.H.

Testing Methods

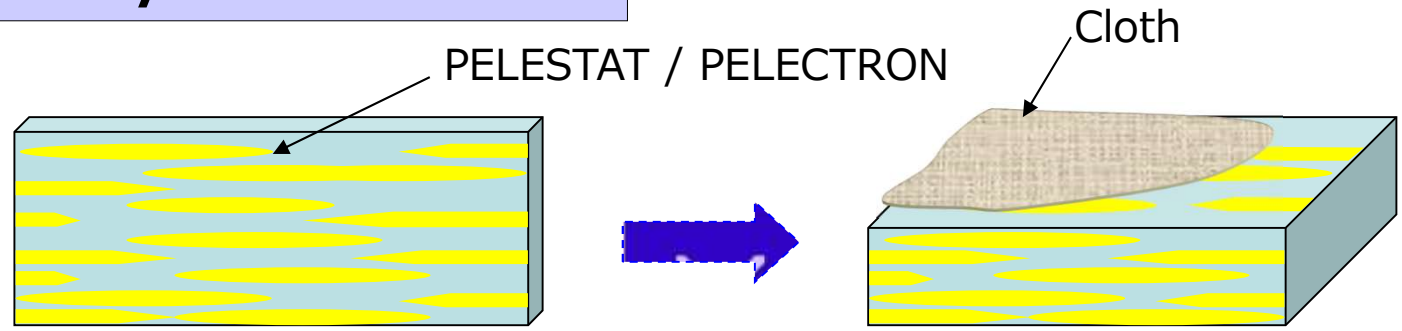
PELECTRON PVL and LDPE were dry-blended and molded using sheeting equipment[extruder (20 mmØ, L/D=25, revolution rate: 50 rpm), die (120 mm, die temp.: approx. 200oC(392oF)] into sheets 100 μm (approx. 3.9 mils).

Comparison data to Low-Molecular-Weight Antistatic Additives

	PELESTAT ・ PELECTRON	Low-Molecular-Weight Antistatic Additives
Surface Resistivity (Ω/sq.)	10^8 ～ 10^{12}	10^9 ～ 10^{12}
Dosage (wt%)	5 ～ 25	0.2 ～ 2
Antistatic Sustainability	○	×
Humidity Independence	○	×
Antistatic at Directly after molding	○	×

Comparison to Low-Molecular-Weight Antistatic Additives

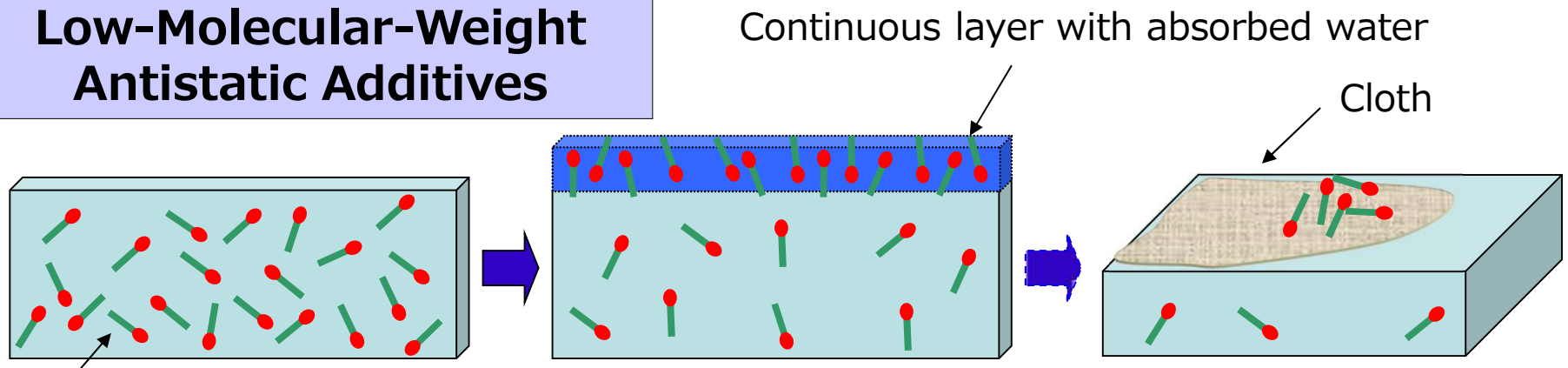
PELESTAT / PELECTRON



PELECTRON forms streaky conductive networks in the surface layer.

PELECTRON remains in the surface layer even when the product is wiped or water-washed.

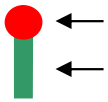
Low-Molecular-Weight Antistatic Additives



Directly after molding

A few hours later

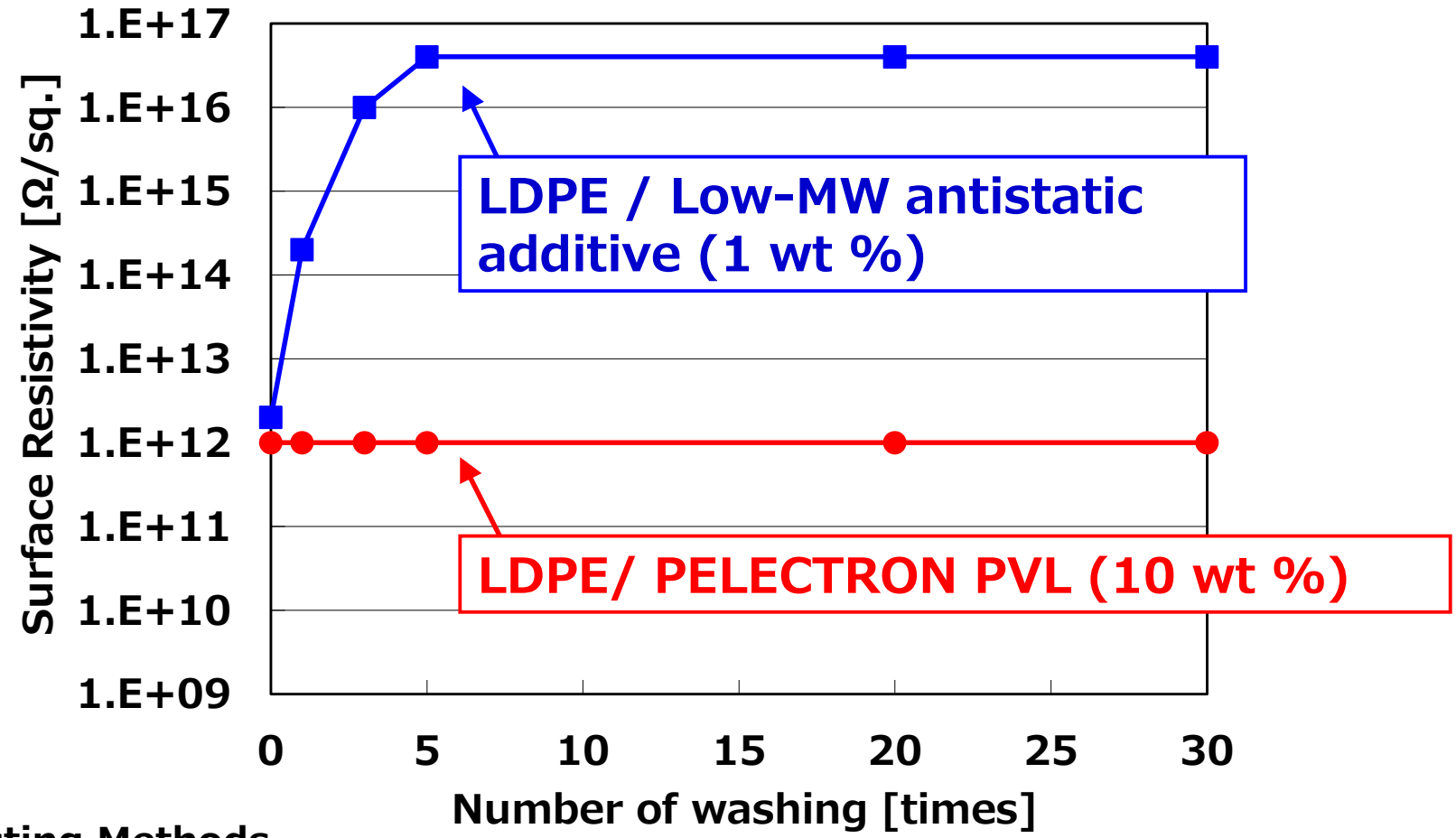
Easily removed by wiping or washing.



Surfactant type Antistatic Additives

The low-molecular-weight antistatic additives form a continuous layer with absorbed water on the surface.

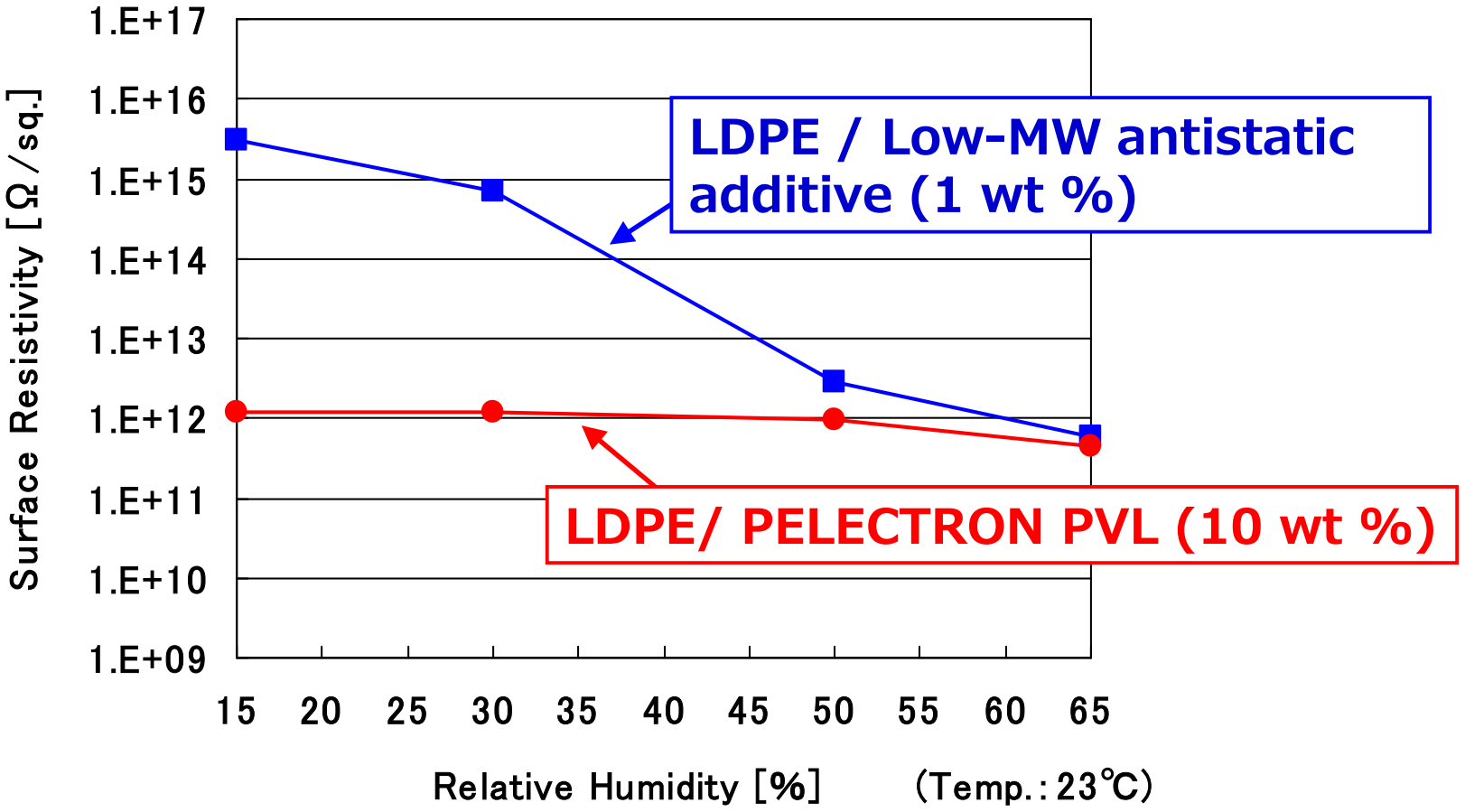
Antistatic Substantivity



Testing Methods

Surface of the test pieces was wiped with a water-soaked cotton cloth. The test pieces were dried in a vacuum (130 Pa) at 70oC for 2 hours and kept at 23oC, 50 % R.H. for 24 hours. Surface resistivity was measured by using megohmmeter.

Humidity Independence



Testing Methods

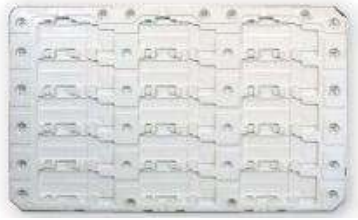
The test pieces kept at 23oC (73oF) under predetermined humidity for 24 hours. The surface resistivity was measured by using a megohmmeter.

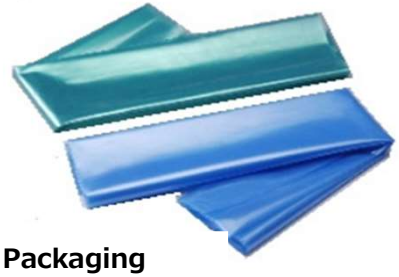
Application

Protection of damage to electronic devices

Protect film

LCD tray

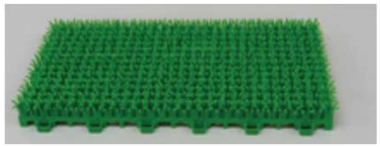




Packaging material

Protection from electric shock

Floor mat



Explosion-proof helmet

Protection of malfunctions

Copier

Repelling dust and dirt

TV

Air Conditioner

Cleaner

For electronic devices ← → For electric appliances

Surface Resistivity (Range of Antistatic)

10^{8} 10^{9} 10^{10} 10^{11} 10^{12} 10^{13} (Ω/sq.)

PELESTAT Standard grades

	No.1 PELESTAT 300	No.2 PELESTAT 230	No.3 PELESTAT NC6321	No.4 PELESTAT NC7530
Basic structure	PP-b-PEO	PP-b-PEO	6Ny-b-PEO	6Ny-b-PEO
Melting point (℃)	135	163	203	176
MFR (g/10min)	30 (190°C,21.18N)	14 (190°C,21.18N)	20 (215°C,21.18N)	10 (190°C,21.18N)
Refractive index	1.49	1.49	1.51	1.53
Surface resistivity *1(Ω/sq.)	1×10^{8}	5×10^{7}	1×10^{9}	2×10^{9}
Recommended Molding method	Injection	Extrusion	Injection Extrusion	Injection Extrusion
Adapted Thermoplastic resins	PP, PE etc.	PP, PE HIPS etc.	ABS, PC/ABS, PBT etc.	transparent-ABS, MS etc.
Features	–	–	–	High refractive index

*1 : 23℃(73°F), 50% R.H.

PELECTRON Standard grades

	No.1 PELECTRON PVL	No.2 PELECTRON AS
Basic structure	PP-b-PEO	PA6-b-PEO
Melting point (℃)	135	195
MFR (g/10min)	15 (190°C, 21.18 N)	30 (215°C, 21.18 N)
Refractive index	1.49	1.50
Surface resistivity *1(Ω/sq.)	3×10^{6}	4×10^{6}
Recommended Molding method	Injection Extrusion	Injection Extrusion
Adapted Thermoplastic resins	PP, PE HIPS etc.	ABS, PC/ABS, PC etc.
Features	Low resistivity	Low resistivity

*1 : 23℃(73°F), 50% R.H.