

DSC

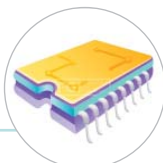
Dry Surface Control



OLED/DISPLAY

For Total Solution

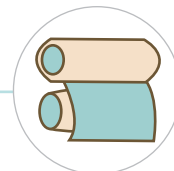
Atmospheric Plasma



SEMICONDUCTOR/PACKAGE



AUTO MOTIVE



NEW Materials for R2R

PCB

PLASMA

TSP/MOBILE

BIO/MEDICAL



A.P.P Co.,Ltd

Greetings!

History has been developed continuously for the happiness of mankind. While people enjoy better life with all those developments, we now face a bigger challenge to protect and preserve the environment for tomorrow.

With a leading edge technology based on the atmospheric plasma solution, APP has joined this effort by producing better products which consume less energy and require shorter process time.

APP is a total plasma solution provider encompassing all the technologies from Ar, N2 to Air plasma serving various customer needs. Through functional treatments like reduction, sterilization, nano coating, ashing and etching, APP enables our customers in display, semiconductor, automotive, Bio and solar cell industries to make their products most competitive and cost effective.

In addition to the plasma, APP also provides reliable low frequency generators and automation equipments for enhanced and optimized solutions.

Everyone at APP is fully committed to provide the best value to our customers in harmony with the environment and appreciates your unwavering support.

Banabas Kim

Thank you!

Overview

Company	APP Co ., Ltd
Foundation	2006. 02. 23
TEL / E-mail	+82-31-373-5956 / sales@aplasma.com
Address	7-12, Dongtansandan 2-gil, Hwaseong-si, Gyeonggi-do, S.KOREA, 18487
Business Fields	



Dry Surface Control

- Ar Plasma
- N2 Plasma
- Air Plasma
- Corona Plasma

Nano Coating

- Hydrophobic
- SiO2
- HMDS
- TEOS

Nano Etching

- A-Si
- Poly-Si
- SiO2
- SiON
- Si3N4
- PAC
- MoTi

Diagnostic & Automation

- OES Diagnostic System
- Robot System
- Conveyor System
- Roll to Roll System



APP Mission 使命

We create value of 10 dollars from a technology of 1 dollar value.
 We use 10 dollars to make it worth of 100 dollars.

**1달러의 기술로 10달러의 가치를 만들고
 10달러를 100달러 가치로 쓰는 회사**

我们用1美元的技术, 创造10美元的价值
 我们使用10美元, 产生100美元的效益

Global Network

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 Hunan Province,China

2006 ~ 2008's

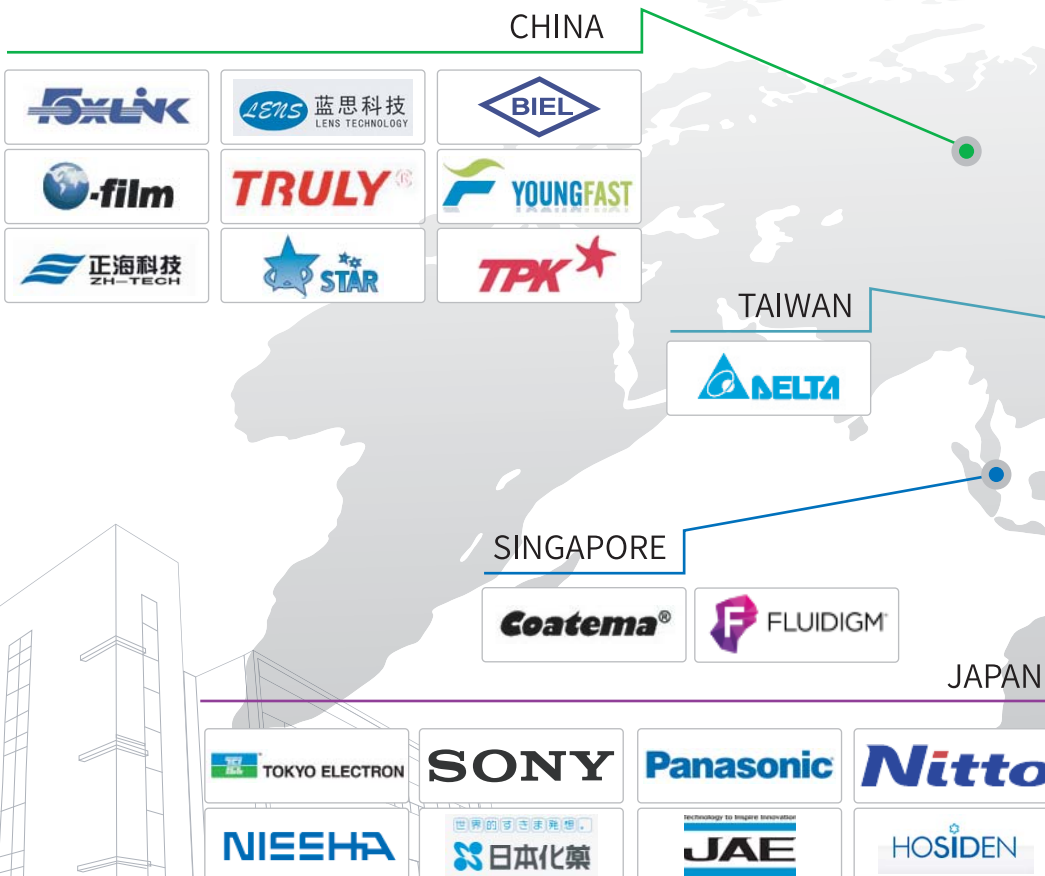
- 2006. 02 Founded APP Co., Ltd
- 2006. 10 Certified venture company, Designated RIS Project by the Ministry of Commence, Industry and Energy. (KOREA)
- 2007. 01 Establish laboratory effiliated company
- 2007. 11 Register "Hydrophobic, Super-Hydrophobic System" patent
- 2008. 03 Designated "Export enterprise business" in Korea
- 2008. 05 Certified ISO system quality

Thinking toward the Humanity,
APP Co.,Ltd is professional Enterprise
in the field of atmospheric plasma R&D system.

History

2009 ~ 2013's

- 2009. 07 Launch Atmospheric plasma equipment exports in U.S.A
- 2009. 09 Application for all-round Touch panel manufacturing process
- 2010. 01 Move place of business to Samsung Technopark
- 2010. 03 Launch Atmospheric plasma equipment in Germany
- 2013. 08 Application for 'Flexible' mobile Line



2014 ~ 2016's

- 2014. 01 Move place of business to Dongtan Industrial Complex
- 2014. 06 Application for AEP(Atmospheric Etching Plasma)on OLED Line
- 2015. 01 G8 Ar Direct plasma Launching (2500mm)
- 2015. 03 Build and Relocate HQ to New company Building
- 2015. 06 "PI" AP ashing system Develop
- 2016. 03 Portable plasma "PLAMI" Launching
- 2016. 03 3D N2 plasma Launching

2017 ~ 2019's

- 2017. 02 APP INDIA Mumbai Open
- 2017. 10 APP USA San Jose Open
- 2018. 04 Launch BAM(Business As Mission)
- 2018. 10 Enter OLED / Semi Market

Customers

USA

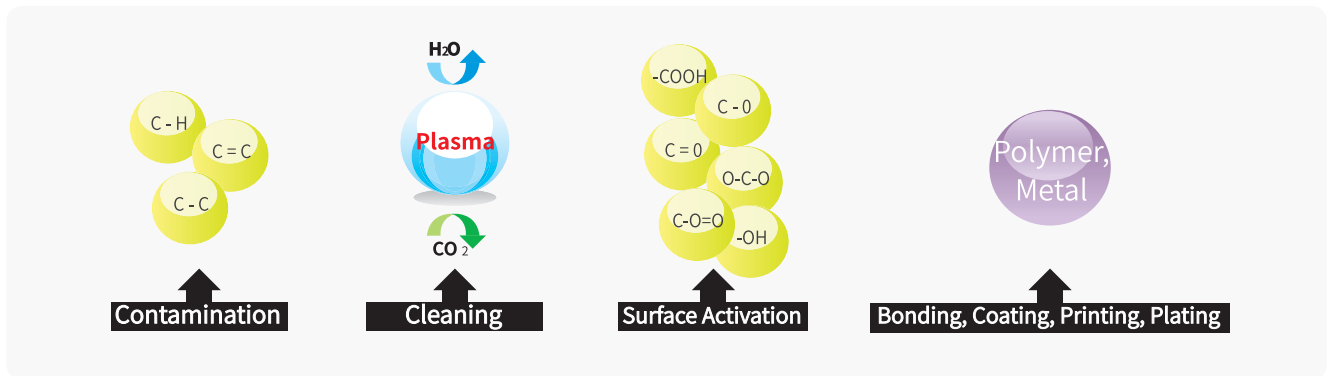
KOREA

Major effects of DSC



Cleaning and Activation

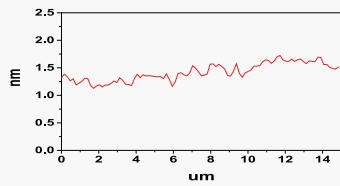
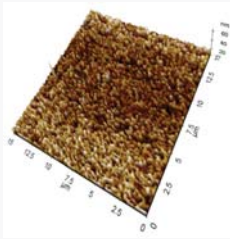


Surface Energy Control



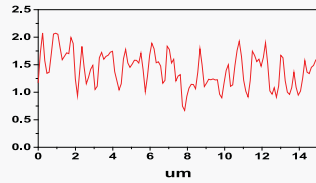
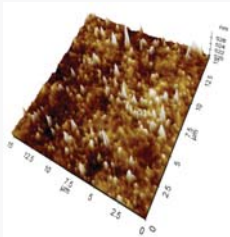
Surface Roughness Control

COP film TEST RESULT : AFM IMAGE



[Raw COP film]

Type	Raw COP film
Roughness (Ra)	0.533 ± 0.118 nm

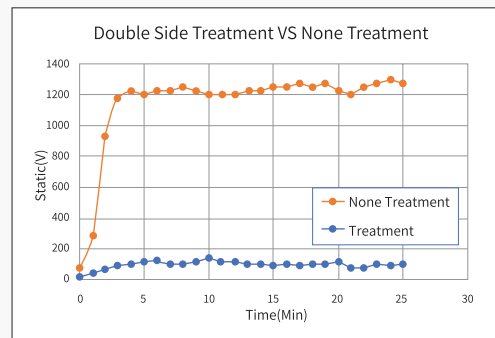
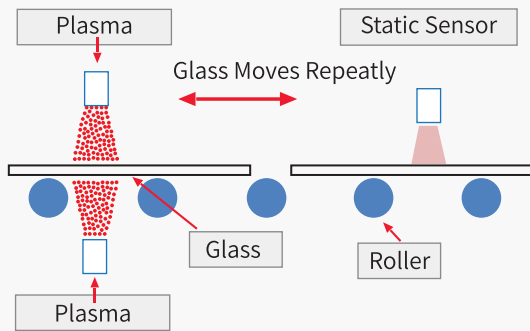


[Plasma treatment]

Type	Plasma treatment
Roughness (Ra)	2.879 ± 0.372 nm

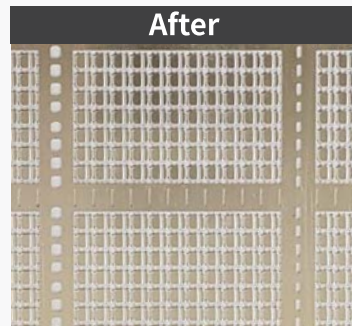
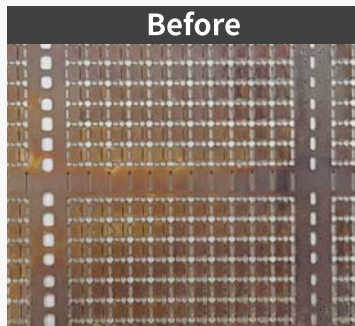
✓ Rough surface can improve adhesion property.

Anti Static Control



DSC Technology Makes Anti Static Surface

Atmospheric Reduction

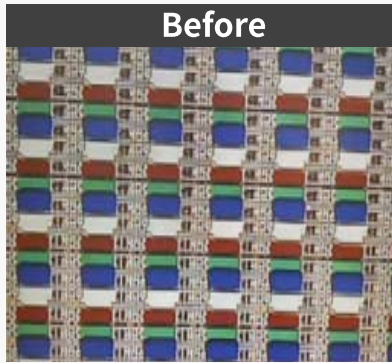


Application

- Bump
- Cu wire
- Lead frame

- Ag film
- Fluxless
- Lead Tap

Atmospheric Ashing



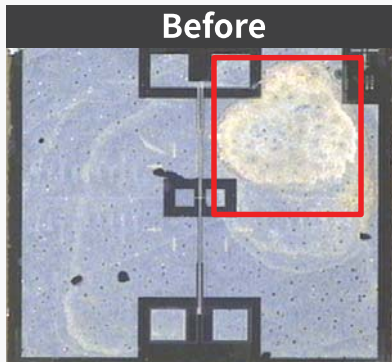
Before



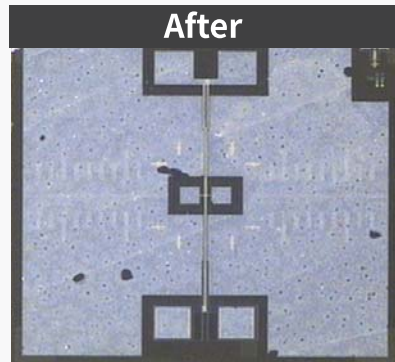
After

Over Coating / RGB layer removal

Atmospheric Ashing

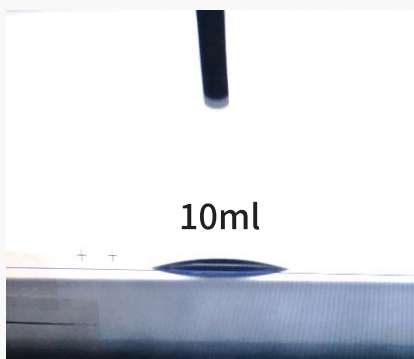


Before

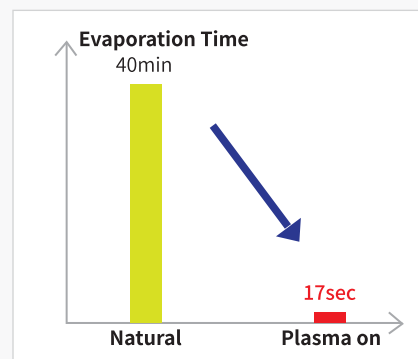


After

Atmospheric Moisture Removal



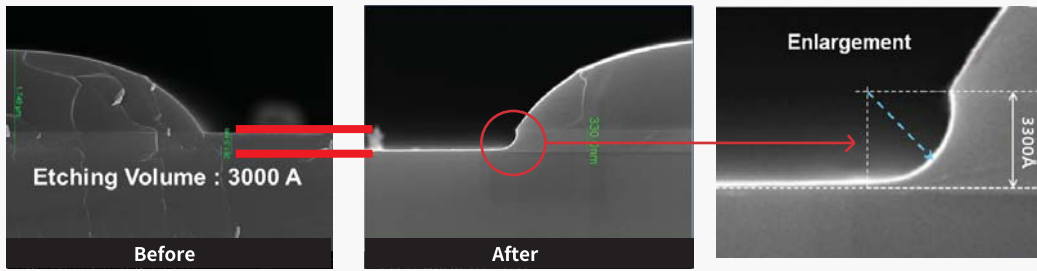
10ml



Item	Plasma ON	Plasma OFF
Drop size	10 μ l * 3Point	10 μ l * 3Point
10 μ l Evaporation	17sec	40min

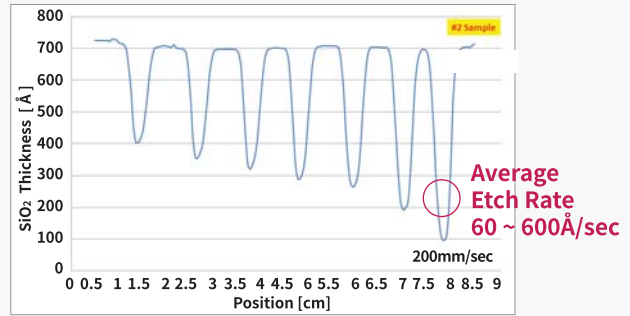
※ 10ml drop size can be Evaporated 100 Times Faster Than Natural Evaporation.

Atmospheric Etching

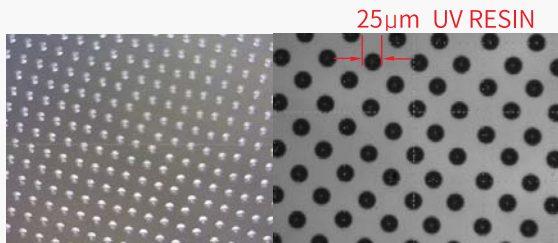


Etching

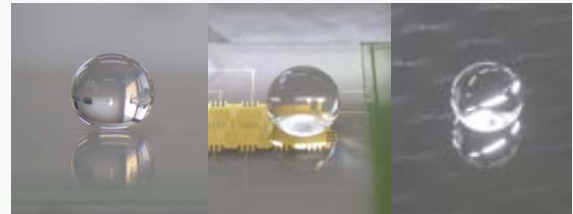
- A-Si
- poly-Si
- SiO₂
- > Si/SiO₂ - selective etching
- SiON
- Si₃N₄
- PAC
- MoTi



Hydrophobic Nano Coating



Inkjet Printing



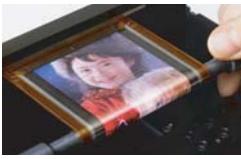
Hydrophobic

SiO₂ Nano Coating

[Performance of Deposited SiO₂ Thin film]

	Hardness	refractive Index	Insulating performance	Deposition Rate
Results	>9H	1.44	> 5.0MV/cm	~ 57Å/s
Remarks	Pencil Hardness	at 632.8nm	Breakdown Voltage (at 448Å)	

OLED/LCD Display



Flexible OLED



TSP treatment



Automotive touch pad



3D glass

- Initial Glass Cleaning
- Buffer Layer
- TFT Cleaning before PI Layer
- Improve of Blue OLED Efficiency
- Pretreatment Seal Dispensing
- Pretreatment TAB bonding
- Moisture Removal
- PI Film Cleaning & Activation
- Etching Process
- Enhance WVTR

LED Package / LCD



LED package



LCD monitor



After plasma



No plasma

- for injection molding
 - resin/leadframe adhesion
- Pretreatment for die attach
- Pretreatment for wire bonding
- for molding
- for glue removal
- TFT process : Pre-deposition, Pre-Photolithography, pre-etching
- Color filter process : Pre-deposition, Pre-Photolithography
- Cell ACF Bonding
- Module process : ACF Bonding
 - Initial Cleaning
 - PR Ashing
 - RGB ashing
 - Cleaning before BM process
 - Cleaning before etch process
 - Cleaning before CVD, Sputter
 - Cleaning before Photo process
 - Cleaning before BM & RGB process
 - Cleaning before PI ink-jetting
 - Cleaning before Wet etching process
 - Pre Cleaning before COG bonding
 - Pre-treatment for RGB Ink-jetting

Semiconductor



Pretreatment wire bonding



After plasma No plasma



Wire(Au&Cu)



Wafer cleaning

- Wafer Cleaning
 - Initial cleaning
 - PR removal
 - Pretreatment plating
- Screen printing for die attach
- Cu wire cleaning
 - Oxide layer removal
 - Organic removal
- Solder Ball Cleaning
- Solder Ball Mounting
- Au bumping
- Wire bonding (Ag, Cu)
- ACF bonding

Flexible Display / Smart Pad/PCB/FPCB



Smart phone
(Applied by plasma process)



PCB treatment



PCB/FPCB



Reduction of Cu FPCB

- Before - Lamination : OCA film, DAT film
- Optical Bonding : LOCA, Super view resin
- COG,COF bonding(ACF)
- TAB bonding
- Printing of Black Matrix
- Slit coating of photoresist
- AF spray coating
- AR spray coating
- Painting of phonecase
- Dotting of spacer
- DFR Lamination
- Residue removal of Photoresist

- Residue removal of photoresist
- Carbon removal
- Teflon activation
- Reduction of Cu oxide
- Pre treatment for DAF film laminating
- Pre treatment of PET (PI) film for electroless Cu plating

BIO



Hydrophobic coating



Bio



Skin plasma



Biochip bonding

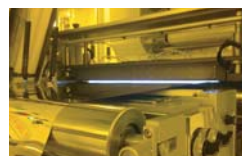
- Petridish treatment
- Biochip bonding (PDMS, Plastic, glass)
- Pretreatment glucose dispensing
- Cell culture treatment
- Sterilization

- Hydrophilic / Hydrophobic treatment
- Hydrophilic / Hydrophobic coating
- Super hydrophilic / Super hydrophobic coating

Solar cell



Solar cell



R2R Plasma



Film



Solder ball

1. Pre-treatment for activation, cleaning, coating(AF, AG, AR) and improve adhesion
 2. APP Plasma improve adhesion of film/foil/sheet, Film/Film, Film/Glass, Film/Metal, Glass/Metal, Organic/Metal, Organic/film
 3. APP technology is highly effective at treating for solarcell manufacture process
- Treatment material : MO, AL, Cu, Stainless steel, Glass, Film (PVCm EVA, PET, PI, PEN, ITO)

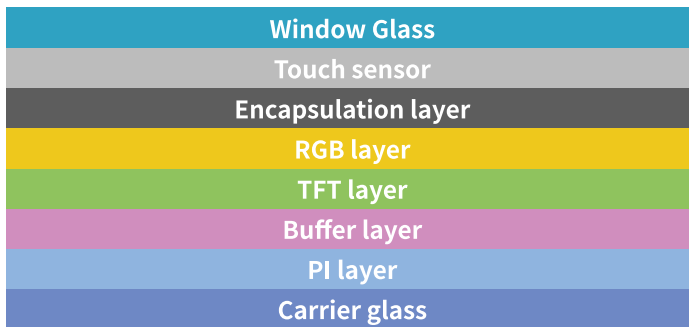
Solar Materials	APP Surface Treatment Purpose
EVA top - Glass (film)	Improve adhesion with Glass (PVC)
Glass - CIGS (CdTe)	Improve adhesion of Cdte / CIGS to glass
Aluminum foil	Clean foil for lamination
Silicon wafer(roll form)	Improve wettability for PV
Polyimide film	Improve surface wettability for metal adhesion

DSC (Dry Surface Control) for OLED Process

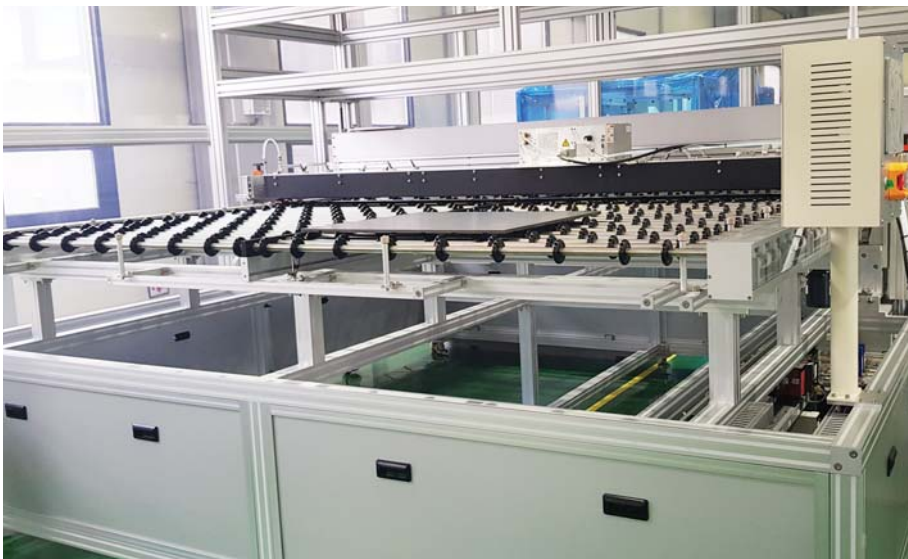
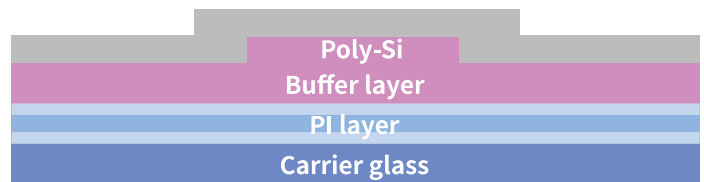


8.5G Ar Plasma (Max : 3 Meter)

OLED Process



- ✓ Surface energy control
- ✓ PI layer control
- ✓ TFT layer control
- ✓ Anti-Static





FEATURES

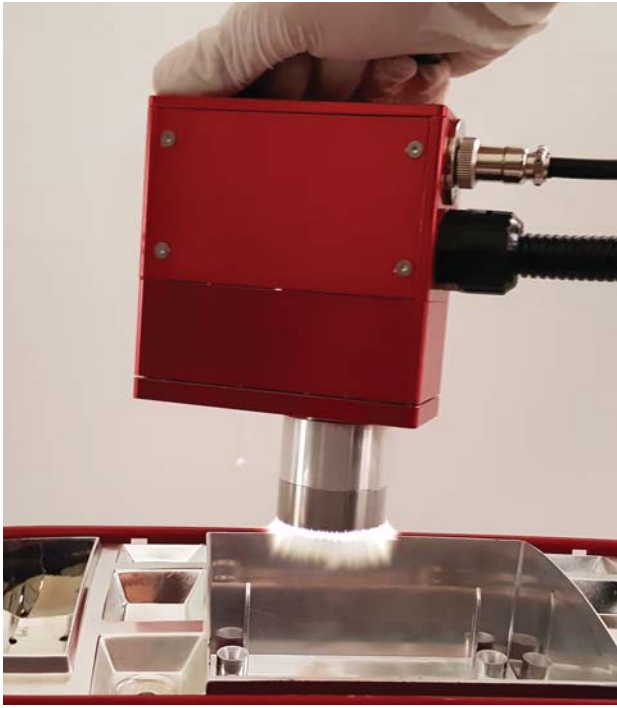
- Visible Plasma
- Minimized Power Consumption
- Mounting with Robot
- None Thermal Damage
- Maximized Plasma Length
- Low Temp. Plasma
- Hand Held



PenJet SPEC.

SPEC.	APP
Power Input	220 VAC, 50/60 Hz, 10A
LF Power	100W
Frequency	20KHz
Input Gas	CDA 0.3MPA
Flow Rate	20 LPM
Head Weigth	0.6kg
Power Weigth	4kg
Plasma Length	10mm





Hand - Held Air Plasma

▶ 40Ø

Dimension	50 x 110 x 155
Weight	1.5kg
Cooling Type	Air
GAS	CDA
Feature	Handy type Plasma



ILT200R-40



Mounted Type Plasma

▶ 80Ø

Dimension	80 x 150 x 172
Weight	2.5kg
Cooling Type	Air
GAS	CDA
Feature	80Ø size plasma mount with robot



ILT-1000R-80



Air Plasma

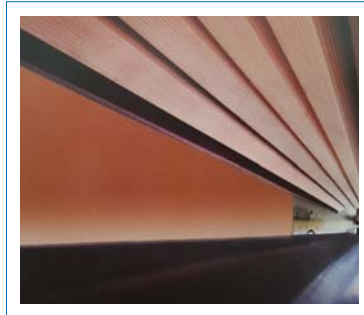
▶ 1kW Plasma Torch



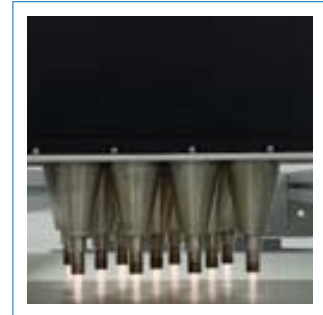
▶ 1kW Rotary Plasma



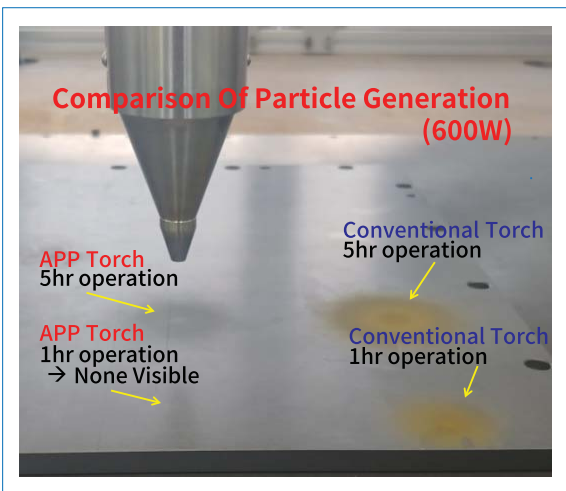
▶ Corona



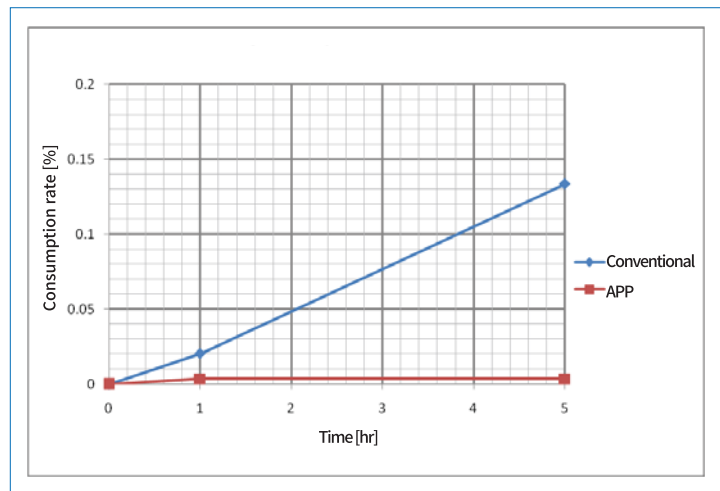
▶ Multi Torch

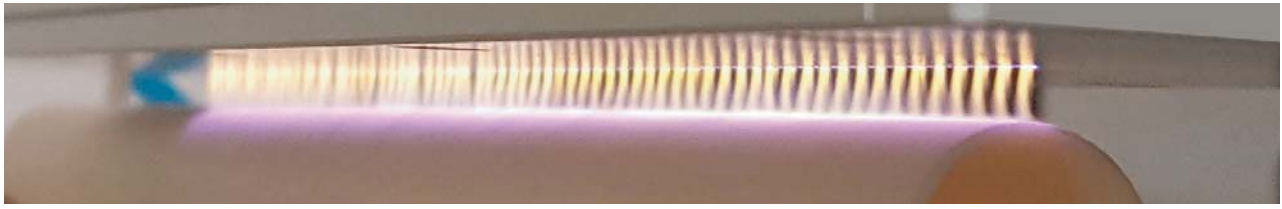


▶ Comparison Of Particle Generation

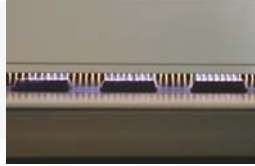


▶ Electrode Durability





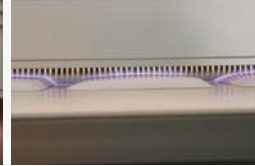
Automotive



IC chip



Low temp. (by hand)



Mobile



Semiconductor

FEATURES

- Visible Plasma
- Maximized Plasma Length
- Minimized N₂ Consumption
- Low Temp. Plasma



APP vs. Conventional

SPEC.	APP	Conventional
Plasma length	~ 15mm	~ 6mm
Contact angle	< 5° at 10mm	< 5° at 6mm
N ₂ Consumption	30 ~ 60 lpm	100 ~ 200 lpm
Power Consumption	500W at 200mm	1KW at 200mm
Visibility	Visible	None visible

2D N₂ Plasma

2D N₂ Plasma

100/200/300/400 ~ 2500



Plasma Reactor	
Materials	Ceramic : AL203 Purity 99.97%
Plasma Area	100mm ~ 2500 [mm]
Cooling Type	Air / Water

FEATURES

- Arc Free Plasma
- Maximized Plasma Length ~ 10G

DBD N₂ Plasma



Power Supply	
Input Voltage	220V ±10%,3phase 50/60Hz (With E1 Ground)
Output Voltage	Depends on model
Output Frequency	30[KHz] Variable
Efficiency	More than 95%
Voltage Regulation	Within 5%
Communication	Rs232 or D-sub 25pin connector



Utility Supply Unit	
N ₂ MFC	TSC-145 / 0~500[sIm]
CDA MFC	TSC-120 / 0~3[sIm]
Input Voltage	±15VDC or +24VDC
Output Voltage	0~5[V] or 4~20[mA]
Response Time	Within 2 [sec]
Accuracy	Within ± 0.1% of F.S
Communication	RS232 or D-sub 25pin
Materials	STS316L

Large scale (8G ~)

No Particle! No Ozone/NOx!
for Cleaning & Ashing



Industry

ILP Series ILP-200/300/350/400/500/600/700/800/1000/1200/1500

FEATURE

- Plasma surface treatment by In-Line type on Atmospheric Pressure
- Cost Saving by improvement of productivity and Eco-friendly processing
- Surface Treatment on various materials like Glass, Film, PCB and LCD
- Reduction of Gas Consumption and Electricity (existing comparison 1/20~1/30)
- Eco-friendly Surface Treatment without secondary contamination



APPLICATION

- Necessary process on Surface treatment
- Touch Panel Manufacturing
- B/M printing preprocessing
- Preprocessing of AF/AG Coating
- Preprocessing of Wet Cleaning



Mounted

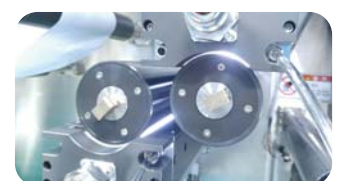
MD-R2R Series DRTR-650/700/800/900/1000

FEATURE

- Roll to Roll Both sides treatment
- Film (PET, PMMA, etc) / Metal Film (Cu, Al, Sus)

APPLICATION

- Film Cleaning
- DFR Lamination
- Printing Electronics
- Fuel Cell process
- PR coating



Mounted

MD Series

MD-60/100/150/200/250/300/400/500/600/700/800/1000/1200/1500/2200

FEATURE

Easy to install on existing Equipment like Cleaning, inspection and Lamination purpose

APPLICATION

Touch Panel Manufacturing, LCD, OLED, SEMICONDUCTOR etc



[MD-60 ~ 2,200]



[Control Box]



[RF Power]



[Matcher]

R & D

MyPL Series

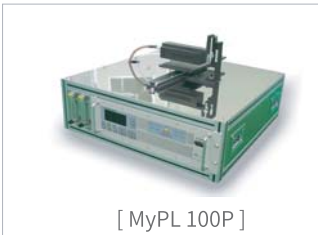
MyPL 100/200/300 , MyPL Auto 100/200/300

FEATURE

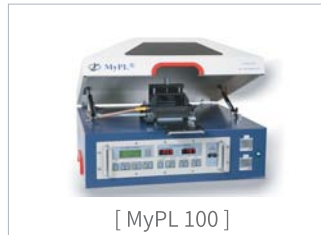
Plasma surface treatment on Atmospheric Pressure
 - Surface modification, Activation and Cleaning

APPLICATION

Application : R&D/ Prototype manufacture
 - Touch screen
 - Flexible display
 - Printing/NANO Printing
 - Preprocessing of Wire Bonding
 - ACF/COF/COG bonding



[MyPL 100P]



[MyPL 100]



[MyPL Auto 200]



[MyPL Auto 300]

Portable

Hand plasma PLAMI

FEATURE

Hand held type plasma.
 Flexible RF cable 4.3m length
 East to demonstration

APPLICATION

Application : R&D/ Prototype manufacture
 - Touch screen
 - Flexible display
 - Printing/NANO Printing
 - Preprocessing of Wire Bonding
 - ACF/COF/COG bonding



Hydrophobic Nano Coating

Hydrophobic IHP Series IHP-1000/2000

FEATURE Hydrophobic surface treatment on Atmospheric Pressure
- Hydrophobic NANO Coating

APPLICATION R&D Field of functional Coating
- Bio Sensor
- Smart watch
- Micro LED
- UV Imprinting
- Optical Device
- Water proof device
- PCB/FPCB
- Light Diffuser lens
- Contact Lens



[IHP-1000]

Nano Coating / “SiO₂ Nano Coating”

In-line process IDP Series IDP-1000/2000

FEATURE Optional NANO Coating by Processing Gas on Atmospheric Pressure
- PMMA, SiO₂, Acryl Acid

APPLICATION R&D
- Insulator film for TFT device
- Optical film
- Carbon Fiber heater
- Micro lens
- LED Package
- Photo Mask
- RFID Device



[IDP-1000]

Etching

Etching IEP Series IEP-1000/2000

FEATURE Surface Etching according to process condition on Atmospheric Pressure

APPLICATION Etching Process on OLED, LCD, SEMICONDUCTOR
- A-Si
- Poly-Si
- SiO₂
 > Si/SiO₂ - selective etching
- SiON
- Si₃N₄
- PAC
- MoTi



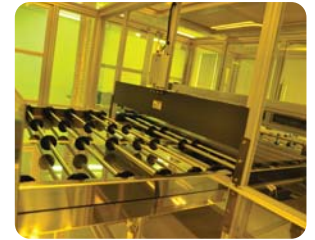
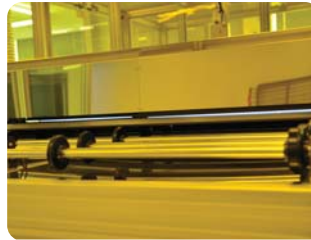
[IEP-1000]

Customized Automation

Plasma Treatment Before Spray Coat : customized automation



- AF (Anti -Finger Print)
- AG (Anti-Glare)
- AR (Anti-Reflect)
- IF (Invisible Finger Print)



IEP (Inline Etching Plasma) Auto Assembling System NANO Coating System



Roller Conveyor Buffer Zone Conveyor Film Tape Attaching



Equipment/System

- Mass Production : Cleaning , Bonding, Ashing , Etching system conveyor type, R2R type, Roll Conveyor, Scan type.
- R&D : Lab scale Plasma machine same as Mass Production system.
- OES Diagnostic system

Module / System

- Easy installation for in-Line process.
- Plasma reactor & Controller (PLC/Touch , Gas Control)
- R2R (Roll to Roll) system

Customer Service

- Plasma demonstration Center
- Various plasma test is available.

 Web Site You Tube

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