



Parylene Asia
Technologies

An ISO 9001-2015 Certified (QMS)

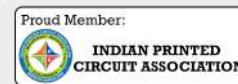
An AS9100D (Aviation & Defence) Certified

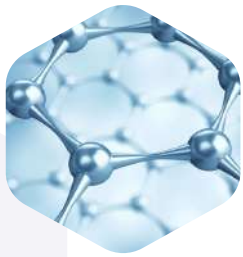
ESD Compliant Environment (ANSI ESD S20.20-2021)

Introduction

Inspired by our government's "**Made in India**" campaign and the potential for semiconductor manufacturing in India, we noticed that we are behind in developing a facility for Parylene Coating of semiconductor chips and printed circuit boards in India. Currently, this service is being performed by foreign companies for our Indian semiconductor manufacturers, which takes time and money.

We have a Parylene coating facility in Bangalore, India, under the name "**Parylene Asia Technologies Private Limited**," to assist our Indian manufacturers in obtaining this service in India.





What is Parylene?

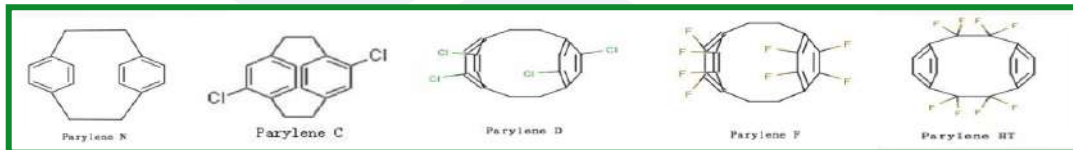
Parylene Coating is the modern and advanced technology in conformal coating.

The chemical name, Di-chloro-di-p-Xylylene & pure parylene C dimer is **Symmetrical dichloro paracyclophane**

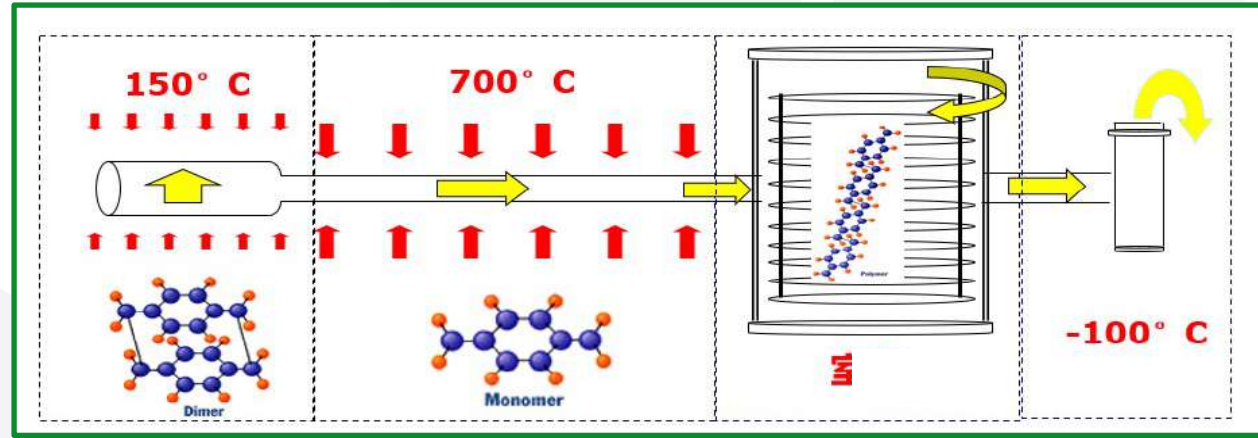
Parylene is a conformal protective polymer coating material utilized to **uniformly** protect diverse substrates as **metal, glass, paper, resin, plastic, ceramic, ferrite & silicon**.

Coatings of parylene are often applied to electronic circuits and other equipment as **electrical insulation, moisture barriers, or protection against corrosion and chemical attack**. They are also used to **reduce friction**, and in **medicine to prevent adverse reactions to implanted devices**.

As a result it provides **protection and enhanced operation** for vital and mission-critical electronic systems.



How Parylene Coating Works



Vaporization Stage

Raw material dimer is vapourised under Controlled temperature Temperature setting depends on amount of dimer used and coating thickness.

Pyrolysis Stage

Gas dimer undergoes pyrolysis under high heat to break down into reactive monomers which then flows into the vacuum chamber.

Deposition Stage

Reactive monomers flows into chamber under high vacuum state and cools to form polymer layer, Necessary for products to be in vacuum and rotated for uniform.

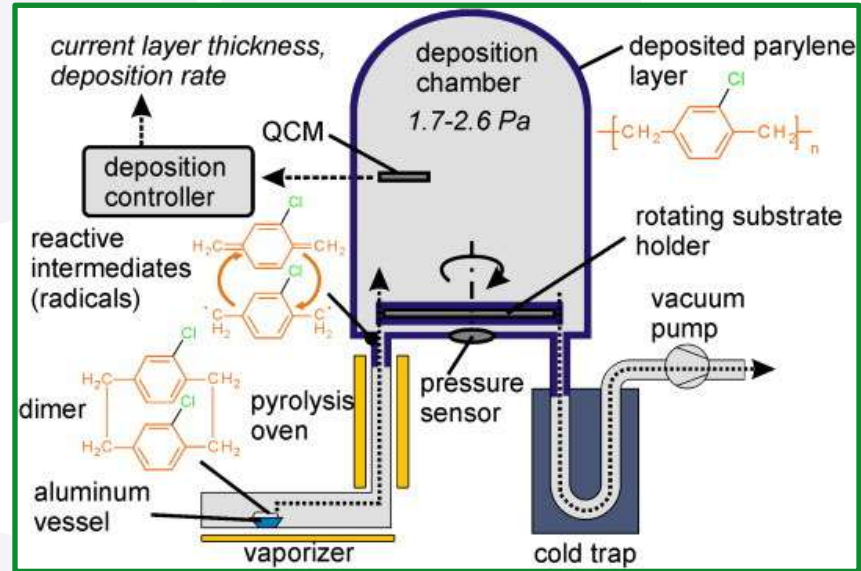
Cold trap Stage

The excess monomer is cooled through the cold trap and dispose Environmentally friendly



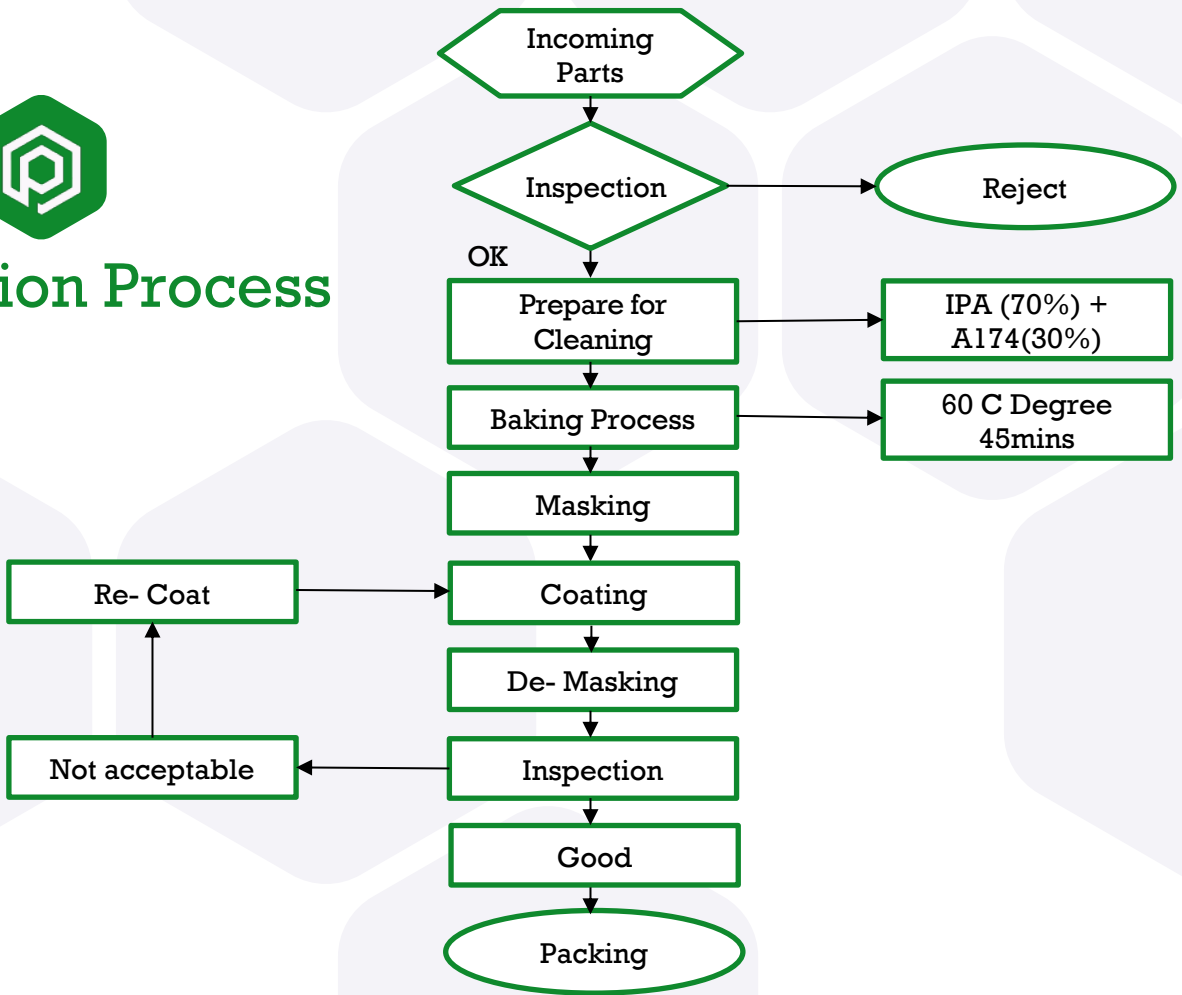
Parylene Deposition Process

- Film grows one molecule at a time
- Coating thickness is Controllable (1 micron to 50 microns)
- Coating thickness is based on dimer quantity and chamber load
- Chamber size is 750mm dia x 900mm height(2.55 feet x 2.11 feet)





Production Process



Diff Types of Parylene (C & N)

- **Parylene C:** The presence of **chlorine atoms** in Parylene C contributes to its unique properties, including **improved barrier properties, increased crystallinity and enhanced Thermal and chemical resistance** compared to other parylene variants. It is often chosen for applications where **increased resistance to moisture and chemicals is important**.
- **Parylene C:** It is often used in applications requiring enhanced barrier properties, such as in the **medical field for coating implants and devices**, as well as in the **electronics industry for protecting sensitive components**.
- **Parylene N:** Being a pure form of para-xylylene, Parylene N exhibits **good dielectric properties**, making it suitable for applications in electronics. It has **lesser thermal resistance than Parylene C**.

Diff Of Parylene C & N

Parylene Type	Thermal	Dielectric Strength(V/mi)	Water Vapor Transmission Rate(WVTR)
C	-100°C to +220°C	5600	.08
N	-100°C to +180°C	7000	.59

Note: Lower WVTR is better barrier protection



The Parylene Advantage

◆ **Physical Properties**

- Ability to treat in nanometres unlike conventional coating process
- Uniformity surface treatment achievable on uneven surfaces
- Precise control over treatment thickness
- Extremely thin coating layers which does not interfere with electronic sensors
- Ultra-thin and lightweight
- Hydrophobicity

◆ **Barrier Properties**

- Extremely resistant to chemical (e.g. Acid/alcohol)/weather (e.g. humidity) corrosion.
- Chemically pure, inert and free of catalytic, plasticizer and solvent residues
- Insoluble in most known organic solvents
- “Pin-hole” free surface treatment-Prevents “out gassing” of rubber materials
- No leachable ingredients



The Parylene Advantage

Electrical Properties

- Excellent dielectric strength
- Volume Resistivity
- Surface Resistivity
- Anti-static
- Insulation (Non Conductive)

Mechanical Properties

- Excellent Lubricity (Smooth)
- No Mechanical Stress during application
- Particle immobilization

Optical Properties

- Surface treatment is optically clear, transparent and colourless.
- Excellent optical protection



The Parylene Advantage

◆ **Thermal Properties**

- Surface treatment can withstand continuous temperatures as high as 220°C (indirect heat) and as low as -100°C without losing its coating properties.
- No thermal stresses during room temperature deposition

◆ **Environment Friendly**

- Environmental user friendly and is in total compliance with impending US and EU EPA regulations (coming in effect from 2006 for RoHS, GREEN)

◆ **Cost Effective**

- Faster turn around time (no other second process needed), No Curing Process Needed
- Cost effective in comparison with other conventional coating processes

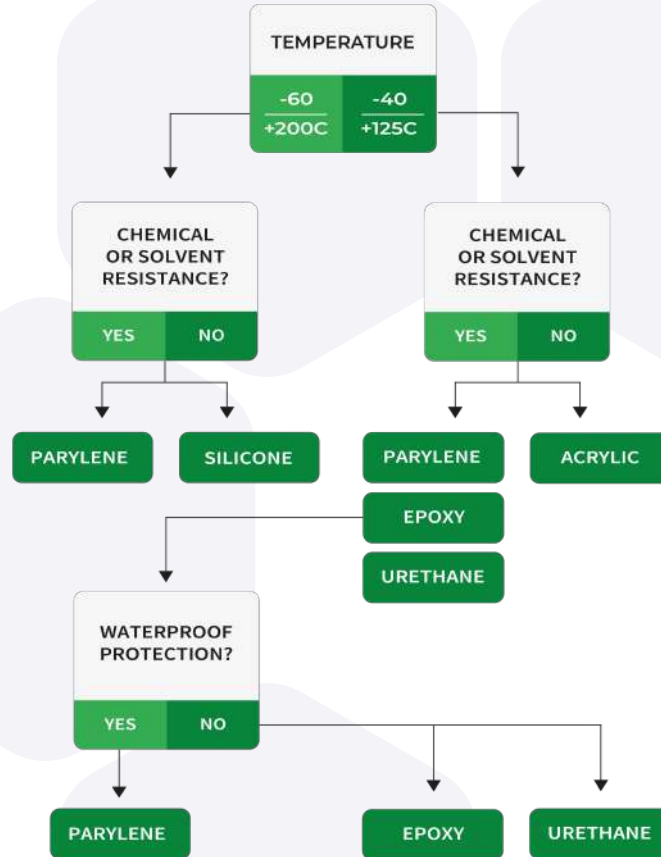


Conformal Coating Comparison Chart

	ACRYLIC	URETHANE	EPOXY	SILICONE	PARYLENE
Coating Quality	Good	Good	Good	Good	Excellent
Chemical Resistance	Good	Excellent	Excellent	Good	Excellent
Dielectric Strength	Good	Excellent	Excellent	Fair	Excellent
Adhesion	Good	Good	Excellent	Excellent	Excellent
Thermal Cycling	Fair	Good	Good	Excellent	Excellent
Abrasion Resistance	Good	Excellent	Excellent	Fair	Good
Application Stress	High	High	High	Low	None
Cure Required	Yes	Yes	Yes	Yes	None
Water Resistance	Poor	Good	Good	Fair	Excellent



How to Choose Right Conformal Coating



Parylene Clarity Test

Clarity test on Treated and Untreated Butyl Rubber Seal. Below testing condition is using flowing warm water with 60 degree C washing with high pressure

Parylene Treated Seal



Untreated Seal

Parylene Aging Test

Aging test on Parylene treated and Untreated Butyl rubber seal.
Below testing condition is under flowing warm water with 60 degree C.
After washing, oven it at 121 degree C for 4 hours.





Resistance Of Parylene Coating to Different Chemical

Films of Coating between 10 and 35 microns in thickness were immersed in the test liquids, and the thickness was measured again by an Infrared method. The time of immersion was 90 minutes at room temperature, and 120 minutes at room temperature, and 120 minutes at 75C. Results of the thickness increase as per cent swelling are given in the table.

Chemical 藥水	% Swelling of Coating			
	Room Temperature 室溫		At 75°C /120 mins	
	10 um / 90mins	35um / 120mins	10 um	35 um
Isopropyl Alcohol 異丙醇	0.3	0.1	0.3	0.2
Isooctane 異辛烷	0.2	0.4	0.3	0.5
Pyridine 吡啶	0.2	0.5	0.4	0.7
Xylene 二甲苯	1.4	2.3	2.1	3.3
Trichloroethylene 三氯乙烷	0.5	0.8	0.7	0.9
Chlorobenzene 氯苯	1.1	1.5	1.7	2.0
O-Dichlorobenzene 鄰二氯苯	0.2	3.0	0.3	1.4
"Freon" 氟利烷	0.2	0.2	0.2*	0.3*
Acetone 丙酮	0.3	0.9	0.4**	0.9**
2,4-Pentanedione 乙醯丙酮	0.6	1.2	0.7	1.8
Hydrochloric Acid 鹽酸 10%	0.0	0.0	0.0	0.0
Hydrochloric Acid 鹽酸 37%	0.2	0.0	2.3	4.1
Sulphuric Acid 硫酸 10%	0.1	0.3	0.2	0.2
Sulphuric Acid 硫酸 95-98%	0.2	0.4	5.3	5.1
Nitric Acid 硝酸 10%	0.1	0.1	0.2	0.1
Nitric Acid 硝酸 71%	0.2	0.2	Brittle	1.8
Chromic Acid 鉻酸 10%	0.1	0.1	1.2	0.0
Chromic Acid 鉻酸 74%	0.3	0.0	8.2	7.8
Sodium Hydroxide 氫氧化鈉 10%	0.1	0.0	0.0	0.5
Ammonium Hydroxide 氫氧化銨 10%	0.3	0.2	0.4	0.4
De-ionised Water 去離子水	0.0	0.0	0.0	0.0



Parylene Applications

Electronics

- Printed Circuit Boards
- Semiconductor Wafers
- Military/Aer/Defence PCBA
- Consumer Electronics
- Automotive Electronics
- Medical PCBA
- Microelectronic Mechanical Systems (MEMS)





Why Parylene Coating is Needed?

Medical implants save lives, but inorganic materials can irritate surrounding biological tissue and cause potentially severe problems for the patient. Parylene conformal coatings significantly reduce this risk.



Medical

- Pressure Sensors
- Ultrasound Transducers
- Cardiac Assist Devices
- Stents
- Prostheses
- Needles
- Epidural Probes



Parylene Applications

Rubber/ Silicone

- Medical Catheters
- Rubber Seals
- Plungers
- Diaphragms



Parylene's thin, transparent and flexible characteristics. Enhance the performance of rubber and elastomer components by protecting surfaces and modifying surface properties. These improvements are made without degrading the functional performance of the part.



Parylene Applications & Industries

Electronics & Semiconductor

- Consumer Electronics Waterproofing
- Printed circuit boards
- IoT devices
- Electronic assemblies
- Batteries
- Micro electro mechanical systems
- Flex circuits
- LEDs
- Sensors
- Electrodes
- Transistors
- Microchips
- Vertical Probes

Medical

- Medical PCBs and sensors
- Robotic Laparoscopic Devices
- Cochlear Implants
- Pacemakers and Implantable
- Cardioverter Defibrillator (ICD)
- Orthopedic Hardware
- Pins And Screws

Elastomer

- Vascular Grafts
- Catheters
- Syringe tips, Gaskets
- O-rings, Seals
- Tubing, Keypads

Transportation, Aerospace & Defense

- Printed circuit boards
- Rigid and flex circuits
- Motor assemblies
- Power supplies
- Transducers
- LED Displays
- MEMS
- Sensors



Our Clients Across Globe

CUSTOMERS

- Centum
- Tesla
- Delta Electronic
- Glowtronics
- BTLNET
- Kaynes
- Jabil

PRODUCTS

- PCBA Defence
- PCBA Car Battery
- PCBA for Automotive
- Medical & PCB
- Medical
- PCB
- PCBA for Aerospace



Production/ Inspection Unit





Production/ Inspection Unit





Get in touch

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Thank You!



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