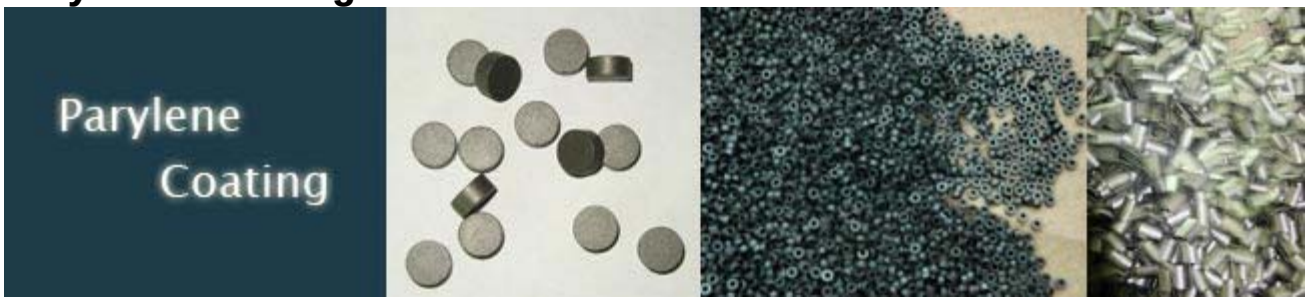
Parylene Coating



Parylene (sometimes known as paralene) is a vacuum deposited plastic film used to coat many types of substrates, and it is considered by many to be the ultimate conformal coating for the protection of devices, components and surfaces in the electronics, instrumentation, aerospace, medical and engineering industries. Parylene materials form linear, highly-crystalline polymers can be usefully produced only as coatings and films. The most commonly used is Parylene C, the mono-chloro substituted compound. Parylene N, the un-substituted compound, has better high-frequency dielectric properties, better penetrating power for coating the bore of very small diameter tubes, and is often preferred in medical applications. Parylene D, the di-chloro-substituted compound, has better high temperature endurance. Parylene coating is unique in being created directly on the surface at room temperature. There is no liquid phase involved. Parylene coatings are completely conformal of uniform thickness and pinhole free. The coating completely penetrates narrowly spaces. No initiators or catalysts are involved in the polymerization, so the Parylene coating is very pure and free from trace ionic impurities. A unique vapor deposition polymerization process achieves it. The advantage of this process is that the coating forms from a gaseous monomer without and intermediate liquid stage. As a result, component configurations with sharp edges, points, flat surfaces, crevices or exposed internal surfaces are coated uniformly without voids. These Parylene coatings provide excellent corrosion resistance, barrier properties and exhibit superior dielectric protection.

The Parylene Coating process is unique in coating technology and is best described as a vapour deposition polymerisation. The deposition process consists of three basic steps, all done in the presence of a vacuum. The process begins with sublimation at about 150℃ of the high purity crystalline dimer di-p-xylylene.

- **Vaporization** - Heating solid Parylene dimer (di-para-xylylene) until it sublimes into the gaseous state. The vapour is pyrolised at about 650°C to form the gaseous monomer which has an olefinic structure.
- **Pyrolysis** - The heating and cleaving of the gaseous Parylene dimer into a monomer (para-xylylene).
- **Polymerization** - The formation of Parylene, as a polymer (poly-para-xylylene), onto the substrate at room temperature.

Parylene has the following characteristic:

- **Transparency** - Parylenes are almost completely unaffected by solvents, have low bulk permeability and are hydrophobic. Coatings easily pass a 100hr salt-spray test. Thin films can be of optical quality.
- **Excellent electrical properties** - Parylenes have low dielectric constant and loss with good high-frequency properties; good dielectric strength; and high bulk and surface resistivities.
- **Good thermal endurance** - Parylene C performs in air without significant loss of physical properties for 10 years at 80°C and in the absence of oxygen to temperatures in excess of 200℃.
- **Coatings perform well as dry lubricants** - static and dynamic friction coefficients of Parylene are equal and comparable to fluoropolymers with the advantage that they also have good wear and abrasion resistance.

- Also parylene is provided with meticulous, even, smooth, good elec-insulation, fungus and bacteria resistance, high tensile, and yield strength. It can prevent the scurviness such as salt-fog, mildew, humidity causticity from outside and protect the magnet well.

Parylene application:

Parylene coating has been commercially available for over 30 years and its properties are exploited in a wide range of applications, including Ferrite core and assemblies(voltage-endurance:2000v), permanent magnet, motor parts, SMD, electronic sensors, and small production coating runs on applications such as printed circuit boards, cultural relic protecting, medical instrument, organic samples, accelerometers, strain gauges, pressure sensors, Hybrid Circuits, Components, Rubber and Plastics, Optics & Instrumentation and many other substrates, etc.

YUXIANG PARYLENE DEPOSITION PROCESS

A.	Dimer is Vaporized inside the cabinet
B.	Vapor is pyrolized inside the cabinet
C.	Vaporization:Di-PARA-XYLYLENE 150℃,1 TORR
D.	Pyrolysis:MONOMER PARA-XYLYLENE 680℃,0.5 TORR
E.	DEPOSITION:POLYMER POLY-PARA-XYLYLENE 25℃,0.1 TORR
F.	Monomer Molecules combine to form conformal polymer coatin