



## VOYAGER

Unique thin film deposition with cutting edge DLC and DLN solutions

### DENTON VACUUM ENABLES INNOVATION

With thousands of thin film deposition tools installed globally — including a large, globally installed base of precision optical deposition systems — engineers and researchers rely on Denton's thin film innovations to drive higher throughputs, better yields and low cost of ownership (COO) while benefiting from comprehensive service and support, and a dedicated R&D program that delivers enabling technologies.

Denton's Voyager offers a range of options for hard coating thin films for relatively small components, or up to 200mm wafers. The Voyager PE-CVD and the Voyager PIB-CVD systems are designed to provide cutting edge DLC and DLN solutions.



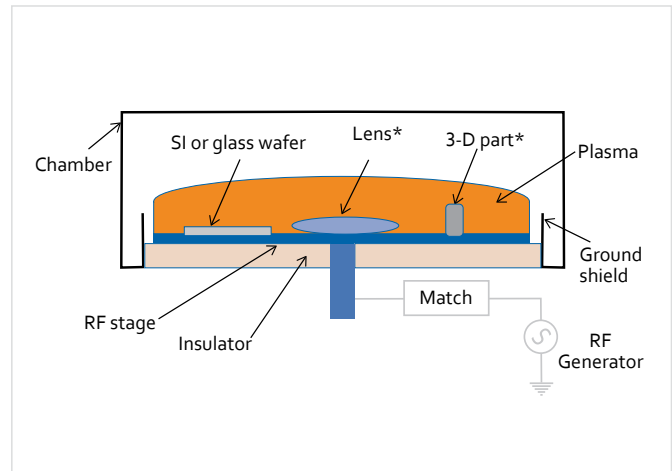
The **Voyager PIB-CVD** adds Denton's patented tunable Plasma Ion Beam CVD (PIB-CVD) process, a low temperature deposition process which produces a wide range of different coatings, supporting not only flowable, soft, thin film encapsulation layers, but also hard, highly hydrophobic, and optically clear coatings.



The **Voyager PE-CVD** uses a RF capacitively coupled source for DLC coatings. An optional proprietary chamber configuration is available to enable co-sputtering of metals during diamond-like carbon (DLC) deposition for metal doped DLC (Me-DLC) films.

## KEY BENEFITS

- Small footprint including pumping package
- Chamber-in-Chamber design provides longer times between chamber clean
- Best-in-class gas cabinets are fully integrated into software
  - Wider selection of process chemistries and other hydrocarbons enable deposition of silicon-doped DLCs with lower stress and tailorable properties, such as lubricity and refractive index



## VOYAGER PIB-CVD – UNPRECEDENTED FLEXIBILITY IN COATING

### Plasma Ion Beam Assisted Chemical Vapor Deposition (PIB-CVD)

The Voyager PIB-CVD is based around Denton's patented Endeavor ion sources. It enables a new class of thin film deposition called Plasma Ion Beam CVD (PIB-CVD) that can be tuned to produce coating compositions ranging from polymer-like to diamond-like coatings (DLC).

The ion source behind PIB-CVD allows the ion energies and oxygen ratio to be adjusted to suit the needs of a wide range of applications, not only for flowable, soft, thin film encapsulation layers but also for hard, highly hydrophobic, and optically clear coatings.

### APPLICATIONS

The Voyager PIB-CVD platform provides diamond-like nanocomposite (DLN) films for:

- Flexible and scratch-resistant displays
- Wear coatings for medical & commercial products
- IR transparent protective films
- Hydrophobic coatings

## VOYAGER PE-CVD

### PE-CVD – Plasma-Enhanced Chemical Vapor Deposition

The Voyager PE-CVD uses a proprietary chamber configuration to enable co-sputtering of metals during diamond-like carbon (DLC) deposition for metal doped DLC (Me-DLC) films. This configuration is unique in the industry and opens the potential to develop novel DLC films with tailorable mechanical, electrical, and tribological properties.

### APPLICATIONS

The Voyager platform provides diamond-like carbon films for:

- Scratch-resistant displays
- Wear coatings for commercial products
- IR transparent protective films



## GAS CABINET

The Voyager is equipped with a semi and display industry compliant cabinet. Its design delivers precursors with a high vapor pressure.

Both Voyager systems are fully compatible with all front-end options, including the Versa cluster architecture, to scale into high-volume manufacturing. The systems are configured with Denton's Process Pro control system, allowing for automated and manual process control and tune-ability.

### SYSTEM CONFIGURATION

- RF Bias Stage
  - Water cooling is highly recommended
- 1kW Mid-frequency (450 kHz) generator with manual impedance transformer
  - Auto-match impedance transformer (optional)
- Vapor Delivery Cabinet to deliver high vapor pressure chemistries
  - Fully integrated into DV PLC/HMI
  - Bubbler or ampoule for chemistry
    - Level sensor (optional)
  - Vapor delivery mass flow controller can be mounted on tool or in cabinet
- Vapor delivery ring is installed inside chamber

	Voyager PIB-CVD	Voyager PE-CVD
Process Technology	Inductively Coupled Plasma	Capacitively Coupled Plasma
Plasma Source	Endeavor Ion Source	RF bias
Application	DLC or DLN	DLC or Me-DLC
Power Supply	Pulsed DC/RF	RF
Vacuum	Cryo or Turbo pump	Cryo or Turbo pump
Substrate Size	Up to 200mm	Up to 200mm
Coating Uniformity	<+/-5%	<+/-5%
Magnetron Sputtering	Optional	Optional
Magnetron Source	6" Cathode	6" Cathode
Sputtering Type	Metal and Reactive Sputtering	Metal and Reactive Sputtering

## VOYAGER PIB-CVD

The Voyager PIB-CVD is a plasma ion beam assisted Chemical Vapor Deposition (PIB-CVD) system built around the filament-free Endeavor RF Ion Source. This patented ion source, by design, has independent control of both ion current density and ion energy over a wide range, capable of producing high deposition rate multilayer coatings. It is able to deposit high rate, high quality coatings at low temperature (below 100°C), making it compatible with typical plastic substrates such as polycarbonate (PC) and polymethylmethacrylate (PMMA).

The Voyager PIB-CVD system was designed with a focus on diamond-like nanocomposite (DLN) to provide best-in-class flexibility to coat planar (ex. silicon wafers), and three-dimensional parts (ex. optical lenses). The system is configured with Denton's Process Pro control system, allowing for automated and manual process control.

## VOYAGER PE-CVD

The Voyager thin film deposition solution offers PE-CVD & sputtering with conformal coatings, low temperature processing and high intrinsic uniformity. The Voyager system is fully compatible with all front-end options, including cluster architecture to scale into high-volume manufacturing.

The Voyager is a plasma-enhanced chemical vapor deposition (PE-CVD) system with a focus on diamond-like carbon (DLC) that provides best-in-class flexibility to coat planar (ex. silicon wafers), and three-dimensional parts (ex. optical lenses). The system is configured with Denton's Process Pro control system, allowing for automated and manual process control.

## ABOUT US

All Denton Vacuum solutions are backed by a 12-month warranty on parts and labor, over 50 years of process knowledge, an in-house process engineering group, worldwide representation and support, and a Global Factory Service Center.