

# HIGH DENSITY PLASMA TECHNOLOGY

ACTIVELY DELIVERING TOMORROW'S  
TECHNOLOGY TODAY



 **TECPORT**

## Never Ending Quest for Excellence in Thin Film Technology

Tecport strives to excel in all aspects of the Total Customer Experience, from design to production, to customer service. We actively seek out leading-edge technologies to provide our customers with the best competitive advantage possible.

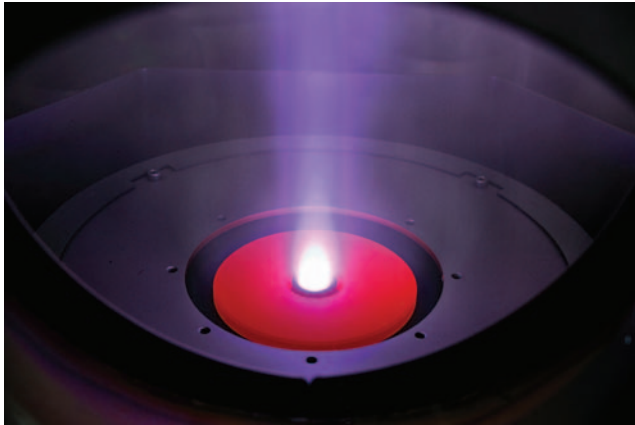
Tecport proudly announces the newest high density plasma technology to the market. Plasma greatly enhances the qualities of films; resistance to environmental changes, improving adhesion and hardness.

High Density Plasma Source is available with Tecport's renowned Symphony model. This gives our customers advantages over conventional electron beam evaporation, opening new doors to many potential applications and industries.

- Plasma Assisted Deposition – Offers higher film adhesion, decreases internal stress of films and improves spectroscopic characteristics compared to the conventional electron beam evaporation methods.
- Plasma Pre-Cleaning – removes oil residue and dust from the substrates.

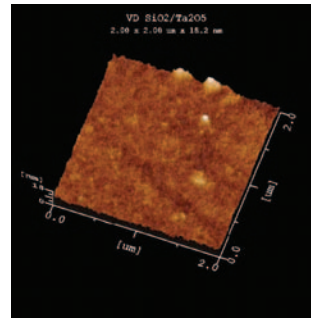
## FEATURES

- High density DC plasma with low voltage and high current allows efficient ionization of neutral particles and gas molecules.
- Can work at the maximum plasma output in a relatively low pressure gas environment.
- It is possible to select the irradiation beam method or reflection-beam method based on the application.
- It requires no special vacuum flanges, can be easily mounted.
- Plasma Output: up to 6.08kW (160V, 38A)
- Operating Pressure:  $1 \times 10^{-2}$  to  $1 \times 10^{-1}$  Pa

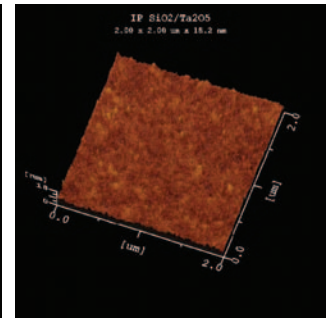


## AFM IMAGE

The surfaces of the film samples discussed were observed with a JEOL scanning probe microscope (JSPM-4210). The AFM images of a 2m square show several protrusions on the conventional e-beam evaporation film, while no conspicuous protrusions were observed on the plasma assisted film.



E-BEAM EVAPORATION  
W/O PLASMA



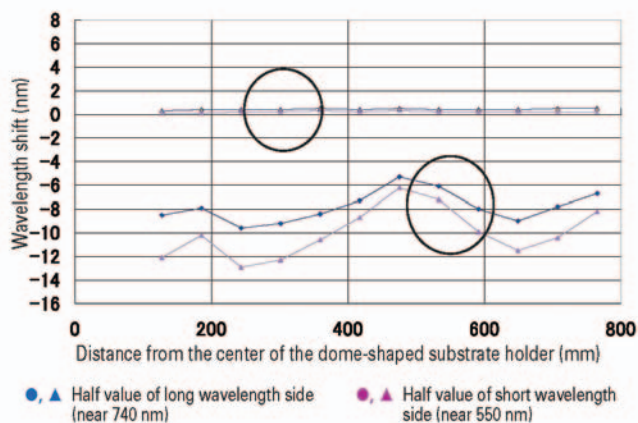
PLASMA ASSISTED  
DEPOSITION

## COMPARATIVE PHYSICS

The following figures show comparative results of multi-layer thin films (19 layers  $\text{SiO}_2/\text{Ta}_2\text{O}_5$ ) deposited using the 6kW high density plasma source in an 1800mm diameter vacuum system.

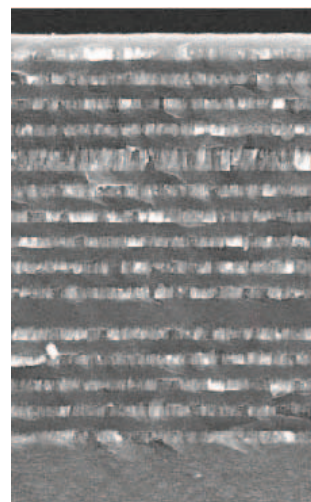
Results show that plasma assisted deposition using the high density plasma source has higher film quality compared to the conventional electron beam deposition without assist, in terms of wavelength shift, smoothness of film surface and density of film.

The wavelength shift is evaluated across the dome shaped substrate holder at wavelength of 50% transmission section of the long wave pass coating.

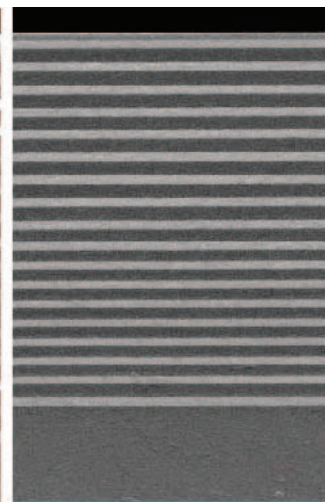


## SEM IMAGE

The cross section of the ion-plated film sample discussed was observed with a JEOL field emission scanning electron microscope (JSM-6700F). The SEM image shows that the plasma assisted film creates a highly dense film with a flatter interface.



E-BEAM EVAPORATION  
W/O PLASMA



PLASMA ASSISTED  
DEPOSITION