



**MATRIX
ASSISTED
PULSED LASER
EVAPORATION
(MAPLE) SYSTEM
FOR HIGH
QUALITY
POLYMER THIN
FILM
DEPOSITION**

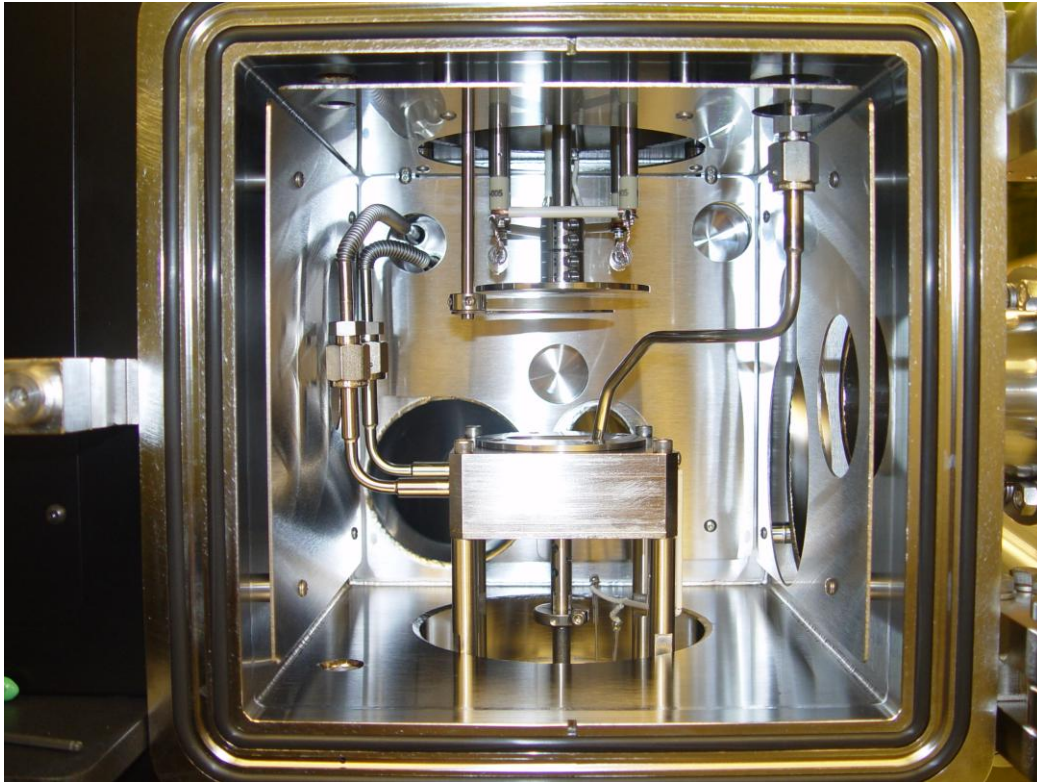
The PVD Products MAPLE-2000 is capable of depositing high quality polymer films on substrates up to 2" (50.4-mm) in diameter. This system uses a 304L SS box chamber with front-mounted hinged door providing quick access for easy substrate changes. The chamber has multiple user accessory ports for target and substrate viewing, loadlock, sputter source, and spectroscopy. The MAPLE process normally includes a polymer material dissolved in an appropriate liquid solvent. The MAPLE system includes the ability to inject this polymer/solvent mix into the chamber that has been pre-pumped and then back filled with dry nitrogen to minimize contamination due to water vapor or air. A liquid nitrogen cooled reservoir surrounds the rotating target and will freeze the polymer/solvent mix to form a solid target. Utilizing an integrated Er:YAG laser operating at 2.9 microns a small volume of the polymer/solvent mix will be flash evaporated with each laser pulse and will throw the polymer into the vapor phase while the solvent is pumped away. Since the energy per photon is only ~0.3 eV for this laser, minimal dissociation of the polymer chain occurs,

providing polymer films with full functionality. A complete enclosed optical train raster the laser beam over the rotating 37-mm diameter target is included for enhanced film uniformity and target utilization. The system includes a 200 L/sec Pfeiffer turbo pump with mechanical pump providing base pressures below 5×10^{-7} Torr without any polymer/solvent mix. One MFC for argon gas is typically provided. A laptop computer with LabVIEW interface provides full system control of MFC flow rate, substrate temperature, substrate and target rotation speeds, pumps, and optional electropneumatic valves. Data logging is also available. This system is ideal for thin film polymer materials science and polymer device development. Coupled with our optional dual wafer loadlock this system will provide high throughput for your polymer film needs.

Larger custom MAPLE systems are available with multiple polymer/solvent target sources and larger substrates. Please contact PVD with your requirements and we can provide a quote.



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Internal view of the MAPLE-2000 system showing the LN₂ reservoir and substrate rotation stage, heater, and shutter.

MAPLE-2000 System Specifications:

Maximum substrate size: Can handle one 2-inch diameter substrate, or multiple small substrates per customer requirement.

Maximum substrate temperature: 300°C with optional heater.

Operating Pressure: Depends on customer's polymer/solvent mix properties

Target Volume: Can be varied per customer requirements to minimize cost of expensive polymer materials

Target to Substrate (Throw) Distance: Variable from 2" to 4"

Nominal Angle of incidence of the laser beam on target: 60°

Base Pressure of the Main Chamber: $P < 5 \times 10^{-7}$ Torr guaranteed, with system at room temperature without polymer/solvent targets in the chamber.

Laser Parameters: 2.9 μm (Er:YAG), 120 mJ/pulse, 10 Hz

Target Temperature: ~-185°C

Target Cool Down Time: ~ 15 minutes

Target Warm-Up Time: ~ 20 minutes

System Options:

Substrate Heaters, Pneumatic Valve Package, Closed-Loop Pressure Control Package, Dual Wafer Load lock, Additional MFC's, Deposition Rate Monitor



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