VELVETCH™
Electron Enhanced Material Processing

EEMP™ Systems, Capabilities, Applications and Support

EEMP Systems

300mm Wafer Stage capacity.

Manual Load Lock for semiconductor wafers.

Wafer Stage options for 300mm, 200mm, 150mm, and 100mm wafers.

Wafer Stage adaptors for research samples down to 10mm x 10mm.

Customizable configurations for nano-materials, bio-compatible materials including metals and polymers.

4 Gas Ports with full control.

Pentium Processor.

SS Hard Disk Drive.

Windows® O/S.

Graphical User Interface.

Windows® Touch Control display.

Full alpha-numeric keypad.

Selectable Language (English, French, German, Chinese)

Integrated software safeties.

Automated Process Control.

Up to 64 process steps.

Storage of unlimited number of recipes.

Production Mode for qualified processes.

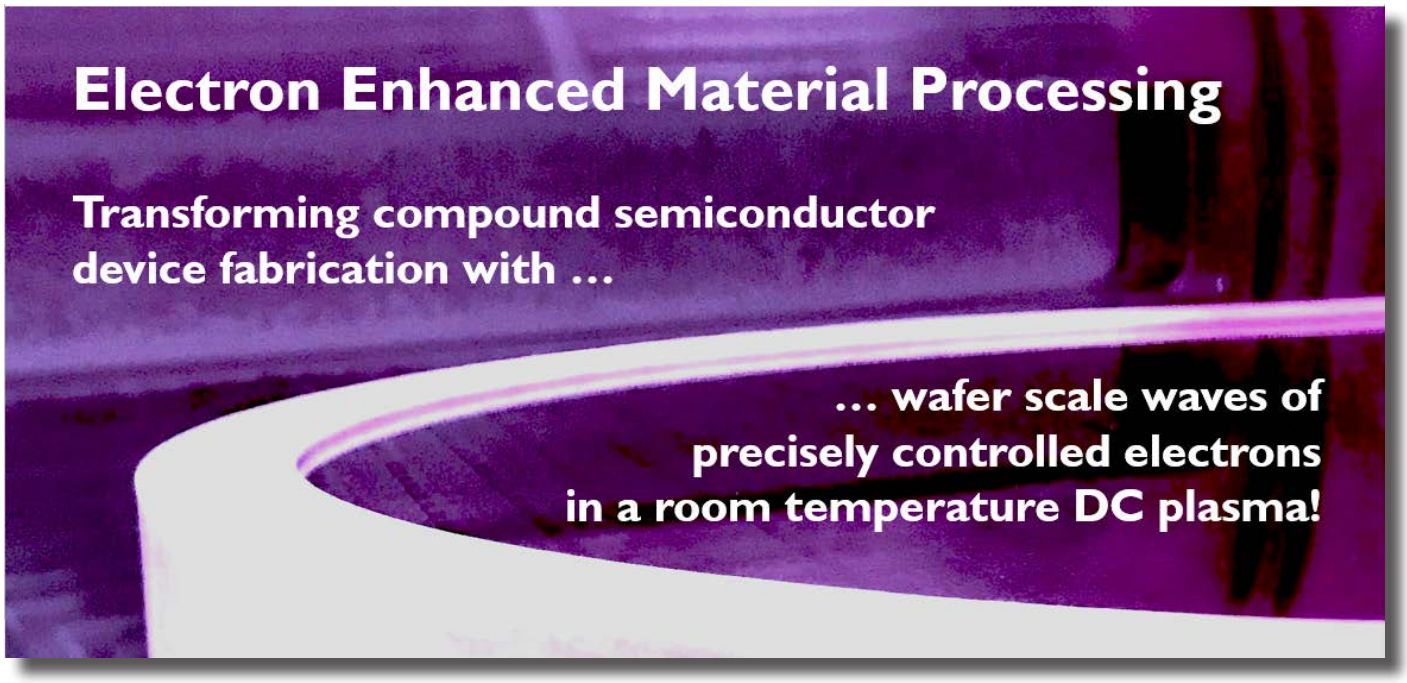
Research Mode for process development.

On screen display of all process variables.

Encrypted Data Collection to Hard Drive.

Multi-level password protection.

EEMP™ Systems, Capabilities, Applications and Support



EEMP Capabilities

High selectivity to any material by adjusting electron energy to material specific excited state surface chemistry reaction energy thresholds.

High etch rates equivalent to ion enhanced plasma etching with no ion bombardment damage, no heat damage.

No lattice damage through excited state chemistry reaction pathways with no ion bombardment.

Atomically smooth etching and polishing. Atomically smooth etched surfaces, unique to EEMP.

Maintains stoichiometry of III-V, II-VI, Quantum Well stacks and low-K dielectrics.

High uniformity with wafer-scale DC plasma source of electrons and wafer-scale waves of precisely controlled electrons.

No notching or bowing of device side walls with no ion bombardment.

Scalable to large wafers and large format materials with uniform DC plasma, no need for hot, multifrequency RF plasma.

Low temperature processing, no generation of heat. All process recipes can be run at temperatures below 100°C.

No need for sample cooling.

Simpler and cleaner excited state surface chemistry reactions with no polymer residues.

EEMP Applications

Clean or passivate III-V, II-Vi, Si, Ge, with Hydrogen at room temperature.

Polish III-V, II-VI, Si, Ge wafers to atomic smoothness, while maintaining stoichiometry, prior to epi growth or device fabrication.

Etch III-V, II-VI to atomic smoothness with no ion bombardment damage, no change in stoichiometry.

Etch III-V, II-VI quantum well material stacks with no surface or lattice damage.

Etch III-V, II-VI, Si, Ge device features to nanometer dimensions with no damage, no notching and no bowing.

Modify the surface properties of metals used to make medical devices.

Modify the surface properties of bio-compatible polymers used in medical applications. Low temperature EEMP processing recipes preserve the shape and physical integrity of polymers.

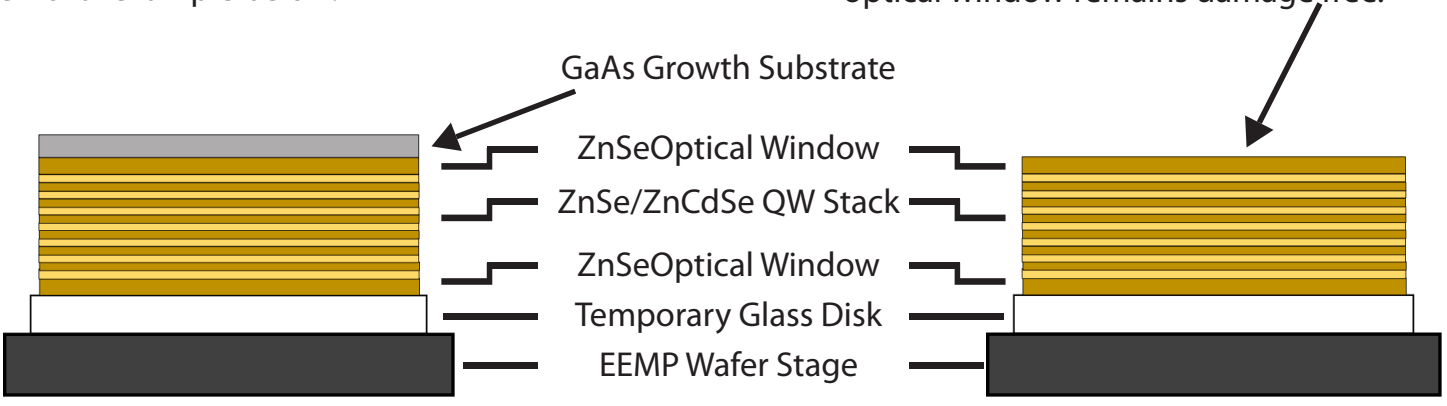
Clean or passivate 2-D devices with Hydrogen at room temperate.

Etch 2-D materials with no ion bombardment damage or change in stoichiometry.

Modify the surface properties of nano-materials and meta materials.

Remove growth substrate layer from quantum well devices with no damage to the quantum well device surfaces or optical windows. See ZnSe/ZnCdSe quantum well device growth substrate removal example below.

GaAs Growth Substrate Removed with EEMP at room temperature. Optical quantum efficiency of ZnSe/ZnCdSe device preserved. Surface and lattice of ZnSe optical window remains damage free.



EEMP Support

VelvEtch has teamed with PVA TePla America to commercialize a full complement of EEMP Tools for a wide range of material processing applications. Both companies contribute to the EEMP Tool designs.

VelvEtch provides customers with EEMP inquiry support, application support, technology training, process development and research services.

PVA TePla provides sales, manufacturing, customization, installation, upgrade and maintenance support.

VelvEtch, located in Pasadena, California, is engaged in the development and commercialization of EEMP Technologies and Tools for materials ranging from semiconductors to compound semiconductors and dielectrics, quantum well devices to 2D devices, and nano-materials to nano-material devices, as well as, bio-compatible polymers and metals for medical applications.

VelvEtch's experience in the application of excited-state surface chemistry principals to the EEMP processing of a wide range of materials provides its customers with unique approaches to meeting their most challenging material processing requirements.

PVA TePla America, located in Corona, California, is a global supplier of custom plasma equipment used in semiconductor, electronics and medical device markets for surface modification of a wide variety of components and materials. They also provide in-house research & development, and contract services for their customers.

PVA TePla's background as a plasma equipment manufacturer provides critical insight into equipment validation, production methods and fixturing, as well as software modifications. Examples include automation of systems for high volume production and customization of fixtures for a wide range of materials, devices and modules.