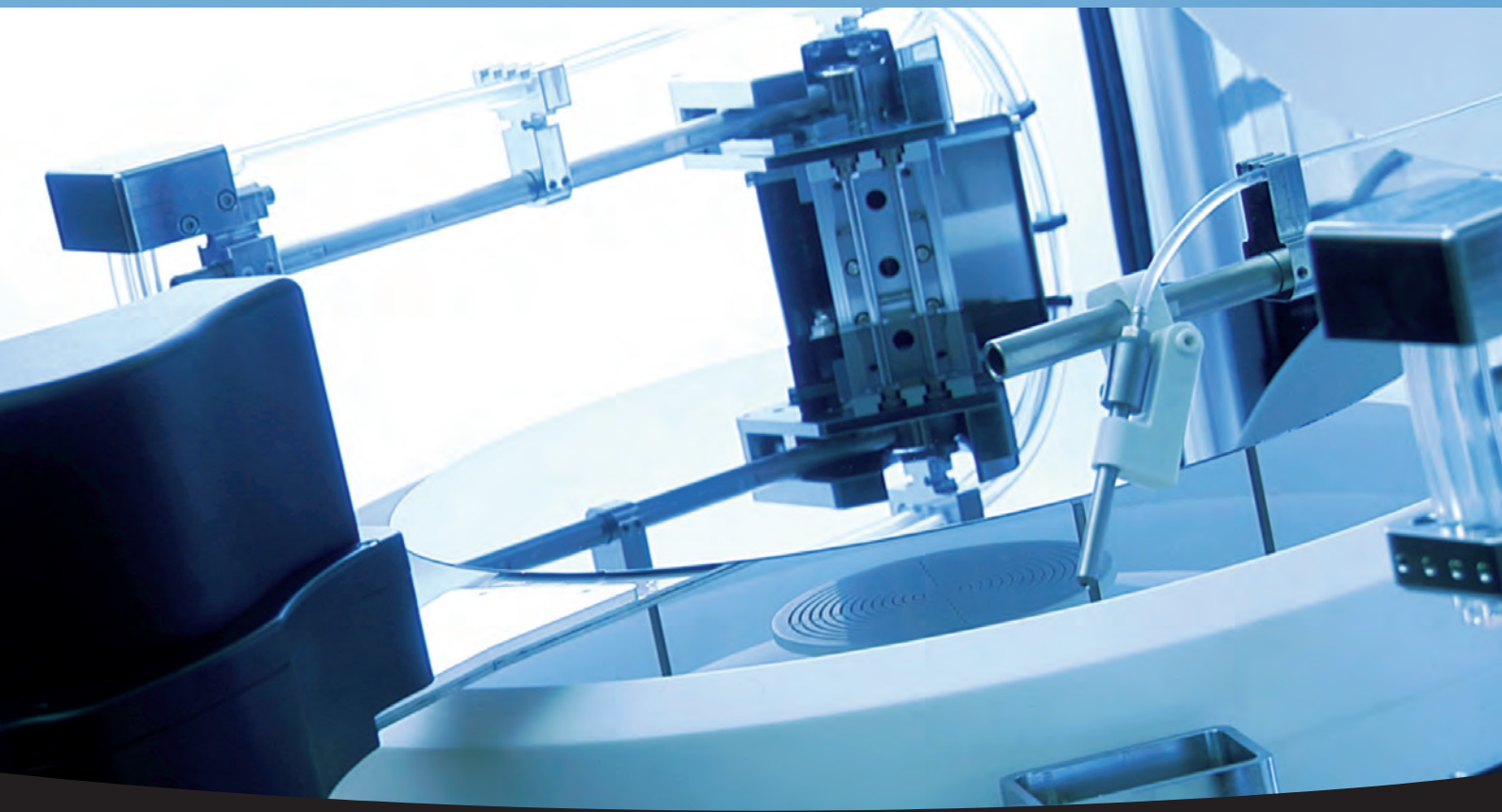
EVG®100 Series

Resist Processing Systems



EVG®

Introduction

The EVG100 series resist processing systems establish new standards in quality and flexibility for photo resist coating and developing. Designed to provide the widest range of process variations, the EVG100 series' modularity accepts Spin and Spray Coat, Develop, Bake and Chill Modules to suit individual production requirements. An extensive range of materials such as positive and negative resists, polyimides, double-sided coating of thin resist layers, high viscosity resists, and edge protection coatings can be processed on the EVG100 series.

EVG resist processing systems provide a high degree of versatility. They can process wafers from 2" to 300 mm diameter, rectangle, square or even irregular shaped substrates. Also, these systems can handle more than one substrate size, up to 300 mm, with no or a very short tooling time. Additional features such as wafer edge handling or thin wafer handling are regularly provided for customers. EVG also offers systems for larger substrate sizes, e.g. for the field of display manufacturing. These functions provide for a wide range of applications in MEMS/MOEMS and semiconductor markets. As with all EVG processing systems, the equipment can be configured for high volume production or R&D environments.

Unique Features / System Configuration

EVG®105 Bake Module

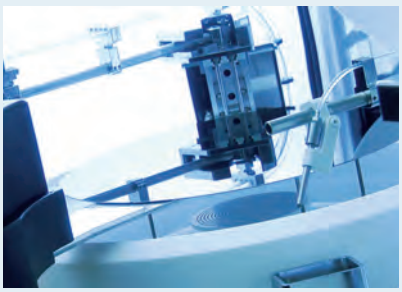
- Stand-alone System
- Up to 250°C
- Lift pins for loading/unloading
- Timer for bake
- N_2 purge optional
- Proximity bake optional

EVG®101 Advanced Resist Processing System

- Semi-automated: automated coating or developing with manual wafer load/unload
- Small footprint while providing a high level of personal and process safety
- Flexible single chamber design for R&D and small-scale production
- Easy process transfer from research to production utilizing proven modular design

EVG®101 Advanced Resist Processing System

EVG®105 Bake Module up to 300 mm



EVG®150 300mm Spin Coat Module

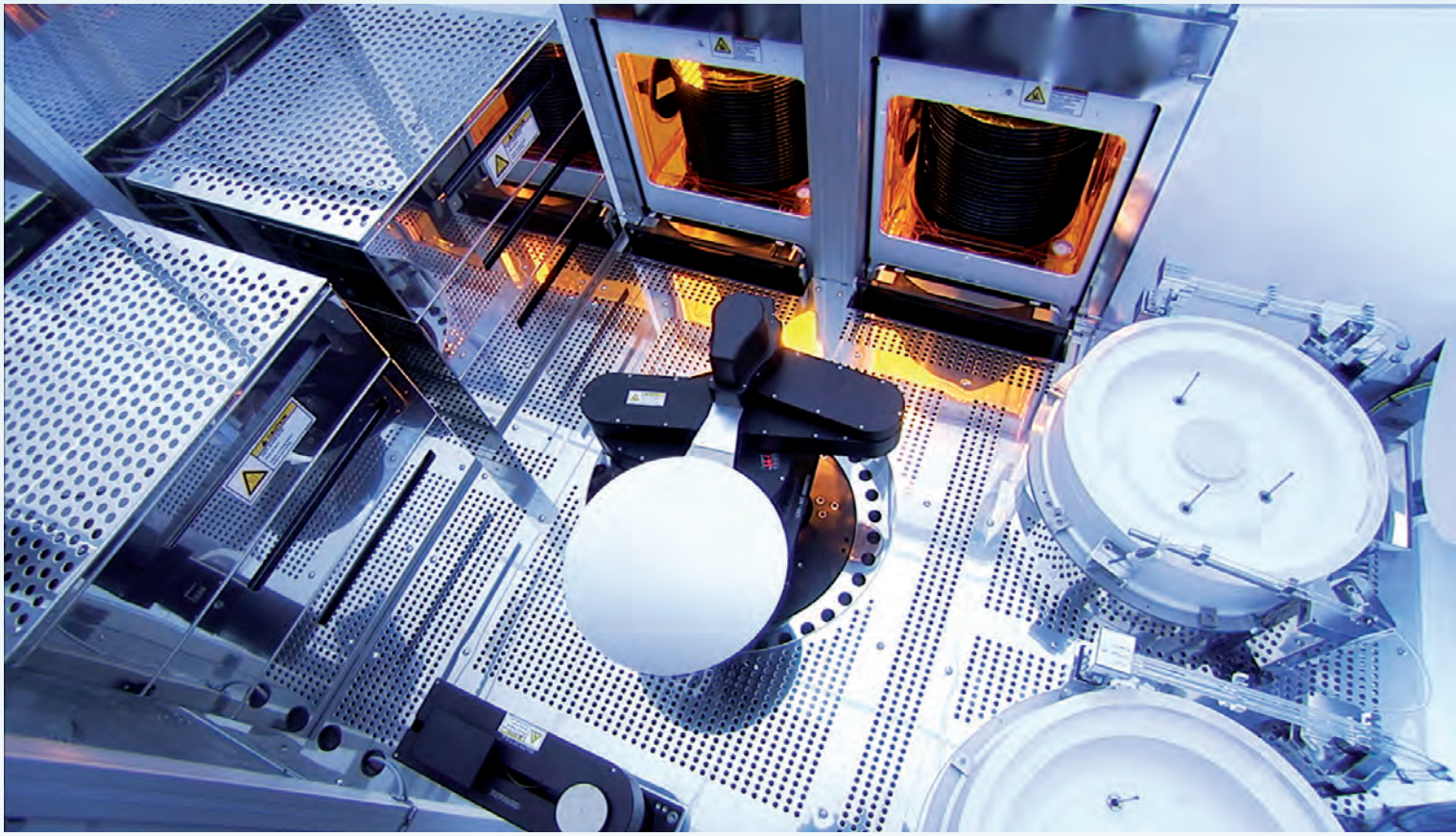
EVG®120 Advanced Dispense Technology

EVG®120 Automated Resist Processing System

- Compact, cost effective system for start of production and limited clanroom space
- Integrated process modules
- Sophisticated field-proven robot wafer handling
- Up to 2 modules for spin and spray coating or development
- Up to 2 stacks with modules for bake, chill or vapor prime

EVG®150 Automated Spin Coating System

- Cost effective system for optimized throughput
- Integrated process modules
- System customized for best benefit, including tooling (chucks), handling (robot, endeffector, pre-aligner) and modules
- Up to 4 modules for spin coating, spray and NanoSpray coating, development
- Up to 2 stacks with modules for bake, chill or vapor prime



EVG®150 Automated Resist Processing System up to 300mm

HERCULES® Lithography Track System with coat/expose/develop configuration

HERCULES®Light with thin wafer handling

EVG®100 chemical storage system

EVG®150 sophisticated and customized handling solutions

HERCULES® Lithography Track System

- Integrated tool for coating, mask alignment, exposure and/or developing
- Wafer processing with high throughput and reduced manpower
- Substrate handling by robots
- Spin and/or spray coating
- Soft bake, prebake, vapor prime and/or wafer cooling
- Alignment with EVG IQ Aligner or EVG6200 alignment systems
- Exposure with lamp houses up to 5kW
- Post exposure bake
- Development
- Ergoload cassette stations or SMIF Pods/FOUPs
- Chemistry handling in separate cabinet

Modular Design

The EVG150's modular design allows the system to accommodate combinations of Spin Coat, Spray Coat, or Develop Modules.

Spin Module

Spin chambers with encapsulated solvent atmospheres ensure uniform high viscosity resist coating. Along with various dispensing modes (center, area or edge), very thick layers of up to several hundred microns in one spin cycle can be achieved. Multiple resist types can be handled within one Coat Module. Furthermore combinations of spin and spray coating with one coating chamber is frequently provided to customers. This option increases tool flexibility to a new level. In addition a pre wet dispense feature will help to reduce resist consumption and therefor cost of ownership whereas uniformity will be improved.

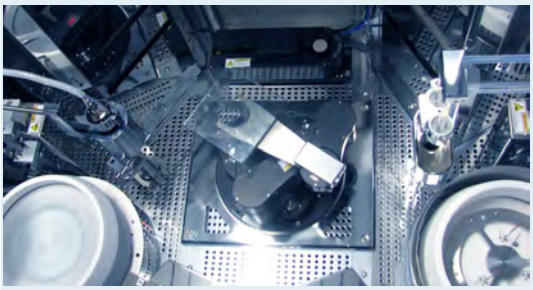
Develop Module

The Develop Modules are configured for spray, stream and puddle dispensing of multiple developer solutions. Maximum flexibility is achieved through the use of fully programmable processes and easy conversion of wafer sizes and developer types. Ultrasonic enhanced development represents a novel development method especially for thick resist applications. Faster processing time, improved yield and reduced chemical usage are resulting in major cost of ownership decrease.

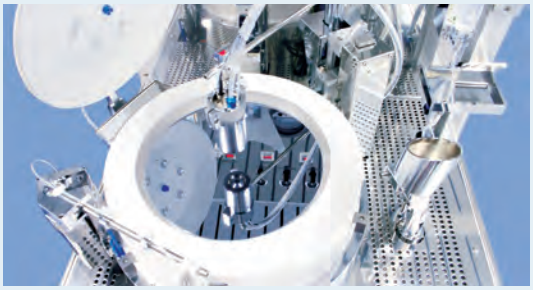
Bake Module

Softbake, post-exposure bake and hardbake processes can be selected. This well controlled baking environment assures uniform evaporation. Programmable proximity pins provide the best available control of resist hardening processes and temperature profiles. The closed environment inside these modules enables a wide range of process performance, even down to an oxygen level of 100 ppm. Another important feature is the stacked design of the module which requires less floor space for equipment installation.

Despite stacked design, maintenance is done easily without removing the Bake Module from the system. This provides short downtime, ease of use, reduced costs and increased uptime.



EVG®150 Automated Resist Processing System



EVG®101 Spin/Spray Coat Module

Vapor Prime Module

To enhance the adhesion of photoresist layers, the Vapor Prime Module treats the wafer surface with organosilane vapors, such as HMDS.

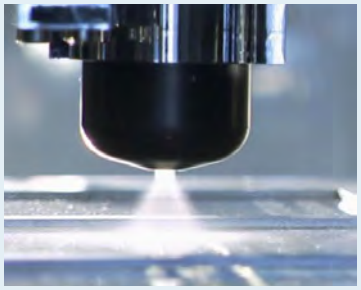
Chill Module

This module includes a temperature-controlled water cooled chuck with proximity pins and the option to use soft contact chilling. The Chill Modules can also be stacked to minimize footprint.

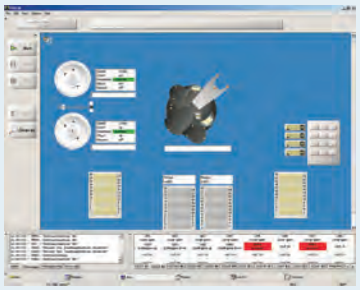
Spray Coating

EVG's proprietary OmniSpray technology guarantees optimized coating of high topography surfaces for the most innovative applications in advanced packaging and MEMS production. Wafers with deep etched cavities can be uniformly coated.
The range of applications also includes coating of square substrates, irregular shapes and perforated substrates. Coating parameters such as nozzle position, wafer speed, solvent content and dispense time can be precisely controlled and repeated.

EVG®150 Automated Resist Processing System up to 300mm



EVG®150 unique spray coating performance



EVG®120 Software screenshot

NanoSpray

This enhanced, patent pending spray coating technique is used for coating very small, but deep patterns.
It is especially useful for coating vias with diameter of less than 200 µm and aspect ratios up to 1:10. Sidewall angles can be vertical.

Software and Process Control

EVG's resist processing systems are computer controlled with a Windows® based graphical user interface.
Three levels of access to the process control software are provided for operator, engineer and maintenance functions.
Drag & drop recipe programming in combination with the unique EVG Explorer interface will guarantee simple and intuitive operation. Advanced remote modem diagnostics are also integrated in all automated systems.

Technical Data

	Semi-automated Systems				Automated Systems			
	EVG®101	EVG®101 Large Area	EVG®105 200 Bake Module	EVG®105 300 Bake Module	EVG®120	EVG®150	EVG®150 NanoSpray	HERCULES®
								
Max. wafer size (mm)	300	300	200	300	200	300	300	300
Max. square substrate size (edge length mm)	200	400	240	300	200	300	300	300
Max. number of spin modules (coat/develop)	1	N/A	N/A	N/A	2	4	3	4
Max. number of further modules (hot plates, chill plates, vapor prime)	N/A	1 (hot plate)	N/A	N/A	8	18	12	24
Spray coating	Spray nozzle programmable parameters: Speed (rpm), acceleration (rpm/s), absolute position Park position (nozzles sealed) and dummy dispense							
Spin coating	Drive Unit up to 10.000 +/- 1 rpm, ramp-up speed up to 40.000 rpm/s | Park position (nozzles sealed) and dummy dispense | Combined spin and spray coating | Pre wet function							
Developing	Pressurized tank, flow control | Nitrogen nozzle for atomizing developer in spray mode; also suitable for puddle and stream (rinse) develop | Park position and dummy dispense | Megasonic enhanced development							
NanoSpray							For coating vias with Ø down to 20 µm and aspect ratios up to 1:10 Sidewall angle can be vertical	
Max. hotplate temp. (°C)	N/A	250	250	250	250	350	350	350
Autom. Options: Resist pumps for spin coating	For resist viscosities up to 52.000cP | Up to 15ml dispense volume, up to 5ml/s dispense rate | Suckback programmable for best uniformity							
Autom. Options: Resist pumps for spray coating	Precise flow control 10µl/s up to 200µl/s for low viscosity resist							
Max. throughput (substrates/wafers per hour)	N/A				120	160	60	90
Class 1 mini-environment	N/A				option			
Automated wafer handling system	N/A				standard			
Fab automation integration (SECS/GEM)	N/A				option			

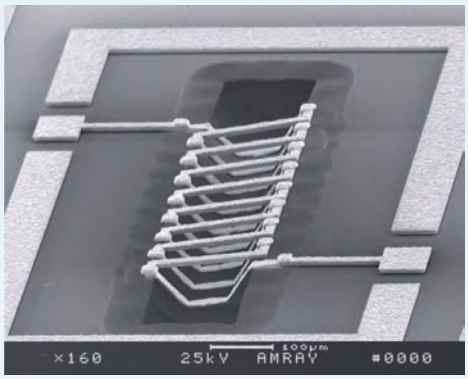
Other features and configurations upon request

Wafer handling on automated systems

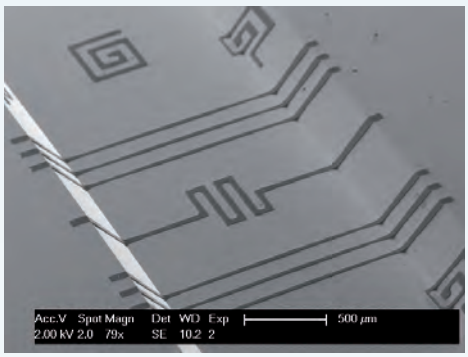
The automated cassette-to-cassette handling system allows for safe and clean handling of substrates with various shapes and thicknesses such as high topography or ultra thin substrates.

The ergonomic cassette loading station provides comfortable and easy loading and unloading with optional SMIF pods for 200 mm wafers or FOUPs for 300 mm wafers.

Process Results

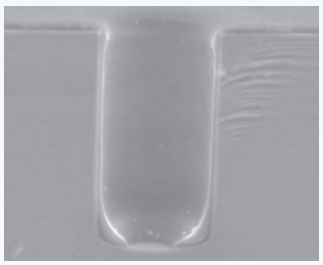


High-Q-3D solenoid inductors for RF ICs.
Metal structures created by utilizing spray coating
Courtesy of SIMIT

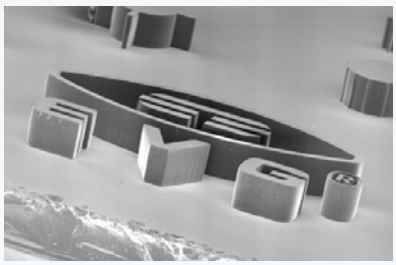


Patterned, spray coated resist layer in anisotropically etched cavity
Courtesy of TU-Delft DIMES

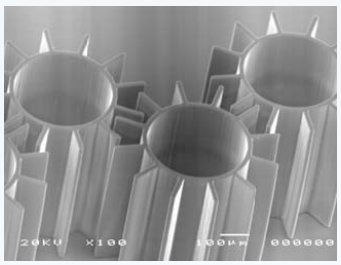
Through-silicon-via (TSV) structure conformally coated utilizing NanoSpray Technology
Source: EVG

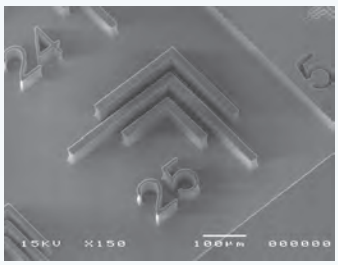


Coated TSV with bottom exposure 100 µm wide, 200 µm deep
Source: EVG

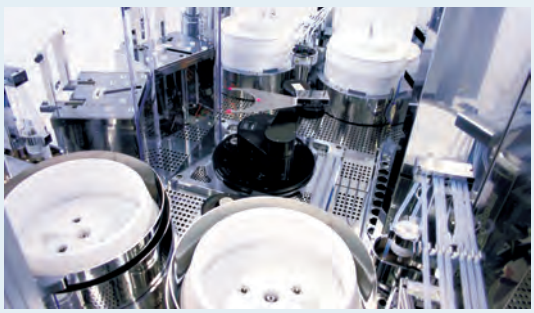


SU-8 structures 470 µm high, developed in PGMEA with megasonic-enhanced development
Source: EVG





50µm thick coated 300 mm substrate
Source: EVG



EVG®150 with coat and develop stations

EVG®150 300 mm stack of Bake, Chill and Vapor Prime Modules

EVG®100 series easy and intuitive operation

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