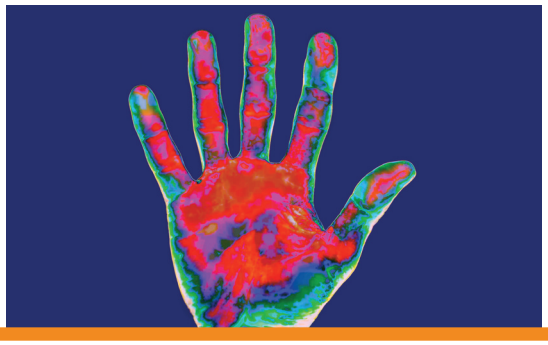
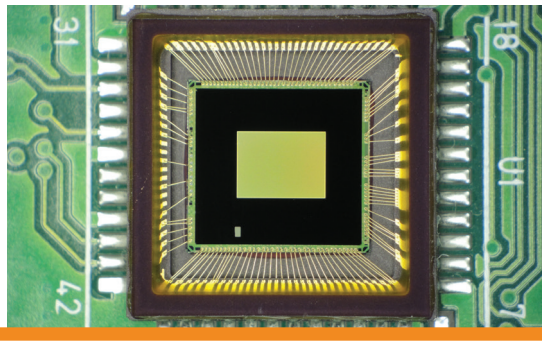
Integrity Indium Coating System

Resistance Evaporation with Low-Temperature Substrate Stage

Denton Vacuum Enables Innovation And Has For Over 50 Years.

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 Indium Deposition Platform

- Proprietary deposition solutions
- Optimized film morphologies
- Stringent uniformities and repeatability requirements
- Wide process capability
- Ease of use
- Superior reliability
- Denton indium system and process support

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Enabling Innovation

Denton Indium Deposition Capability

Denton Vacuum Advantages

Denton Super-Cooled Stage for Small Grains, Textured Films, and Shear Strength Control

Denton Vacuum Optimized Process Geometry

Collimation control of deposition stream that

- Eliminates edge effect
- Minimizes lift off issues
- Optimized lift off yield
- Fully controls deposition angle of incidence

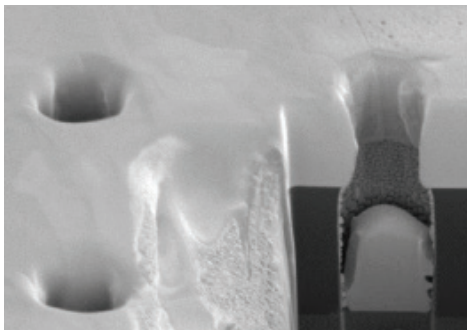
Denton Performance and Value

- High yield lift-off
- Stress control
- High rate - large volume
- Film crystallography
- Optimal grain size
- PID control

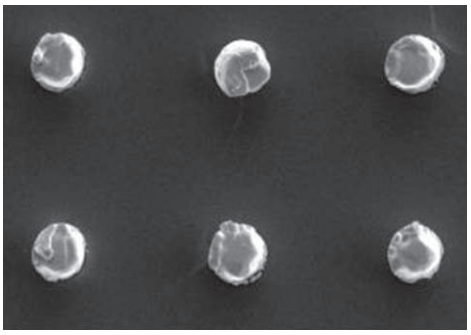
- Denton Integrity-class systems enable high rate, uniform deposition in a development or production environment
- Easy service / maintainable design
- High reliability proven subcomponents

Deposition vs. Bump Diameter – Recent Results

Dense, complete, collimated filling down to 4 microns, required for clean liftoff.



FIB cut through 4 micron via



4 micron bump array

Denton Proprietary Indium Deposition Components

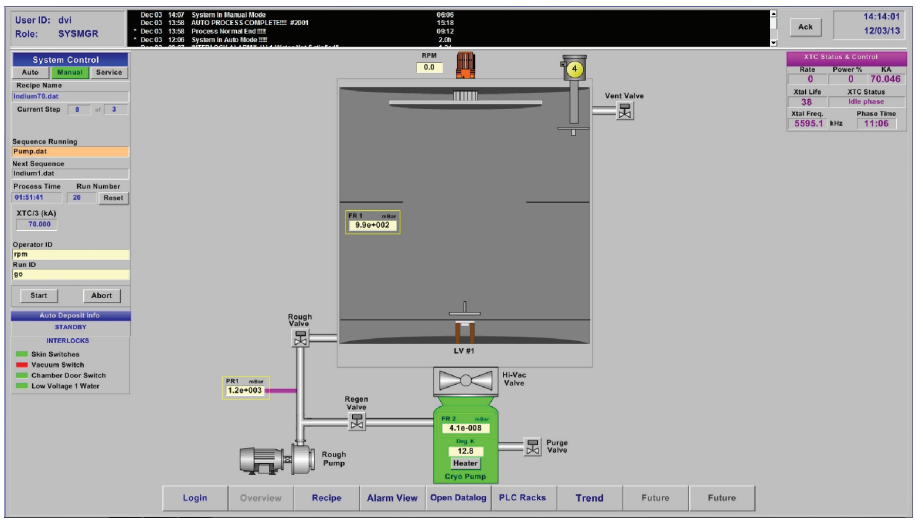
- High deposition rates at low substrate temperatures
- Programmable rate controller optimized for low power use
- Complete system integration for automated operation, including:
  - Rate control
  - Source ramping
  - Substrate fixture control
  - Indexing of masks during process
  - Selection of evaporation sources
  - Pump sequencing
  - Recipe control
  - Rotating fixture for uniform deposition
  - Rate monitoring
  - Shuttering
  - Heating
- Option available to validate rate prior to deposition

Denton Vacuum's proprietary, large-capacity 6Kw (A-B select) thermal source provides:

- Efficient cooling for smaller grain size
- Low stress
- Large volume
- Absolute deposition control
- Stable operation
- Deposition rates up to 100 Å per second
- Superior adhesion
- Reliable, repeatable operation
- Robust source for indium deposition
- Low maintenance source
- Ease of servicing

Indium Integrity Innovation

- Temperature management system supports a fluid cooled substrate stage capable of setting a temperature range - 70°C to + 110°C.
- Temperature managed by thermocouple/PID loop and monitored at the exit port of the substrate holder.
- High-torque DC motor, customized high reliability feedthrough for low temperature operation, programmable 0-20 RPM.
- Innovative wafer clamping design with proprietary thermal interface.
- When run at the designed source-to-substrate distance (unique indium chamber design), achieves high uniformity without shadow masking.



SYSTEM CONTROL

Indium Deposition Control System Options

- Developed on the GE Fanuc Cimplicity® HMI
- Visual system configuration and status
- Password protected access levels
- Windows 10 operating environment
- Comprehensive process data logging through MS Access®
- Remote diagnostics through Ethernet port
- Available with an economical PLC controller with a color screen HMI

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Denton Vacuum Indium Coater Specification

Standard Configuration

Chamber

- Approximately 45" high x 22" wide x 26" deep.
- 304 stainless steel construction, water-cooled via exterior welded 304 stainless steel u-channel.
- Optional chamber temperature control includes re-circulating water chiller/heater; +15°C - +50°C integrated to system controls for power and automatic temperature setpoint operation.
- Full-width opening door, two internally shuttered 100 mm viewports with welding glass holders.
- Two complete sets of removable, stainless steel, evaporant shields (multi-piece construction to facilitate removal and reinstallation, with integral handles).
- Internal water-cooled collimating plate (mounted horizontally below substrate).

Pumping system

- Cryogenic pump with water cooled compressor and temperature diode.
- Dry scroll mechanical pump.
- High-vacuum regeneration and roughing valves.
- Two full-range gauge transmitters; one Pirani gauge transmitter.

- Denton Vacuum proprietary evaporation source.
- One 6-kW resistance evaporation power supply interfaced to the deposition rate controller.
- Two high-power, water-cooled power feedthroughs.
- Can be configured for dual, sequential (a/b select) evaporation.

Shutters

- Electro-pneumatic source shutter assembly dedicated to the low voltage sources.

Deposition controller

- One quartz crystal rate controller interfaced to system computer for automatic source control.
- One rotary sensor head.
- One single sensor head.

Substrate fixturing

- Flat, fluid-cooled plate with compliant gasket material for substrate temperature control.
- One 6- or 8-inch plate, "-70°C to +110°C, 20 rpm.

Fluid temperature management

- Recirculating fluid system to provide temperature control; -70°C to +110°C.
- Temperature control for manual and automatic operation.
- Thermocouple mounted into the fluid output from the stage.
- Temperature feedback displayed on screen and recorded into system datalog.

ProcessPro control system

OPTIONS

- CE Certification
- Plasma cleaning
- Secondary source
- Rate stabilization control
- Alternative substrate size adaptors
- SECS/GEM interface automation standards

ABOUT US

All Denton Vacuum indium tools are backed by an 18-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.

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