THIN FILM DEPOSITION AND MICROFABRICATION

Largest open access pool of instruments for materials research in Canada!

KEY FIGURES:

- Over 370 users annually
- More than 50 M$ in equipment
- 18 skilled professionals and technicians
- Direct access to 27 faculty members
- Serving the community since 1984

STATE-OF-THE-ART EQUIPMENT AND SKILLED STAFF

The GCM has developed an enviable know-how in microfabrication, thin film deposition and micro/nanosystems prototyping. The GCM laboratories are equipped with the latest instruments to manufacture microstructures using a great diversity of materials and substrates, including silicon wafers, glass, ceramics, alloys, metals, etc.

DIVERSIFIED AREAS OF EXPERTISE

› Design of microelectromechanical systems (MEMS)
› Printed circuit modification
› Microsystems prototyping
› Fabrication of optical cavities
› Design and fabrication of sensors
› Anti-wear and anti-corrosion coatings
› Anti-reflection coatings and optical filters
› Circuit edition
› Microfluidics

DESIGN OF SPECIALTY COATINGS

Serving the industry for over 25 years

› Anti-corrosion coatings
› Anti-wear and anti-erosion coatings
› Optical filters
› Anti-reflection coatings

E-BEAM
FIB
DRIE-ICP
RIE
ETCHING
SPUTTERING
PECVD
PVD
CVD
LITHO
CPD
RTA
INTERFEROMETRY
MEMS
CHARACTERIZATION
ELLIPSOMETRY

www.gcmlab.ca

THIN FILM RESEARCH LABORATORY
Jean-Sébastien Tassé, Business Development Manager - industry
Telephone: 514 340-4711 #7458 • Fax: 514 340-5195 • E-mail: jstasse@polymtl.ca

THIN FILM DEPOSITION AND MICROFABRICATION

	Technique	Typical applications	Characteristics
DEPOSITION	**Magnetron sputtering**	Deposition of hard coatings Optical coatings Decorative coatings Metals and alloys	Sample holder: 2-in. and 4-in. diameter. RF on substrate holder Deposition rate: 1 - 10 Å/s Option for codeposition of alloys.
	Electron beam evaporation	Deposition of metals and dielectrics on small samples Electrical conduction	Sample holder: 4 in. diameter. Number of crucibles: 6 RF on substrate holder Deposition rate: 0.05 - 3 nm/s
	Plasma Enhanced Chemical Vapor Deposition (PECVD)	Nanostructured superhard materials Nanoporous materials Optical thin films and dielectrics	Sample holder: 10-20 cm diameter Sample holder temperature: up to 400 0C. Gases available: SiH_4, N_2, O_2, H_2, Ar, NH_3, and others.
	Cathodic arc deposition *Hauzer*	Hard coatings Decorative coatings	Sample holder: 8-in. diameter. Gases available: Ar, N_2, O_2 Deposition rate: 1 - 10 nm/s
	High Power Inpulse Magnetron Sputtering (HIPIMS) *Huttinger*	Hard coatings Nanostructured superhard materials Optical coatings	Sample holder: 4-in. diameter. Gases available: Ar, N_2, O_2 Deposition rate: 1 - 10 Å/s Thickness control: 5%
	Thermal evaporation *Edwards*	Thin film deposition of aluminum and gold	Crucible - sample holder distance: 5 in.
	Parylene Deposition System *Specialty Coating Systems, PDS 2010*	Conformal parylene deposition	Chamber size: 30.5 cm x 30.5 cm. Dimer capacity: up to 0.38 lb
	Dual Ion Beam Sputtering (DIBS) *Spector from Veeco-Ion Tech*	Deposition of optical coatings	Number of targets: 3 Max number of substrates in chamber: 9 Gases available: Ar, O_2, N_2, He
	Focused Ion Beam *FEI Strata, DB-235*	Deposition of platinum for circuit correction	Lateral resolution: ≥7 nm
	Particular Deposition and treatment reactors	Powder treatment and coating 3D objects treatment and coating	-
PHOTOLI-THOGRAPHY	**Mask aligner** *Karl Suss MA-4*	Photolithography, exposition of various resins	Alignment of mask: from 3 to 5 in. Infrared backside alignment Max dimension of wafer: 4 in.
ETCHING	**Deep Reactive Ion Etching (DRIE-ICP)** *Oxford, Plasmalab System 100 ICP 180*	Deep etching of high aspect ratio structures in silicon	Cryo and Bosch processes Etching rate: > 2 µm / min Aspect ratio: up to 30:1 Profile: 90° ± 1° Selectivity: > 75:1
	Reactive Ion Etching (RIE) *Technics*	Anisotropic etching, plasma etching, surface preparation by plasma	-
	Wet etching / wet bench	Wet etching of Si, SiO_2, etc.	Processes: SiO_2 etching, anisotropic crystalline Si etching, etc.
OTHER	**Focused Ion Beam** *FEI Strata, DB-235*	Sample cutting, micramachining, slice preparation, editing of circuits.	Ion beam: Gallium Lateral resolution: ≥7 nm
	Supercritical drying	Remove the liquid phase from a system without stiction	Drying of released MEMS structure. Maximum sample dimensions: 4 in.
	Rapid Thermal Annealing *AG Associates, Heatpulse 410*	Activate dopants, diffuse materials to the interface, relax stress, cristallisation.	Steady-state temperature range: 400-1150 °C Heating rate: 220 °C/s Cooling rate: ≤ 80 °C/s
	UV ozonizing oven *UVOCS, T10x10 OES*	Surface cleaning, hydrocarbide trace cleaning, cleaning of inorganic surfaces.	-
	Surface modification by plasma treatment	Surface cleaning Surface functionalization of polymers Nitridation of metals	Sample holder: 4-in. diameter. Gases available: Ar, N_2, O_2 Substrate temperature: 40°C Thickness control: 5%
	Real-time in-situ ellipsometry **Turning point laser monitoring** **Broadband monitoring**	Thickness control of optical filters Analysis of film growth	Spectral range: 190 to 1650 nm
	Interferometer *Fogale Photomap 3D*	Surface topography Surface imaging	Vertical resolution: < 1 nm Lateral resolution: 0.4 µm to 2.7 µm Max area surveyed: 3.3 mm x 2.54 mm Max vertical displacement: 514.2 µm
	Mass spectrometry *Hiden, EQP500*	Determination of residual contamination Plasma characterization	Mass range: 1-500 amu Ion energy: 0-1000 eV
	Optical emission spectroscopy *Ocean optics USB2000 and HR4000*	Process control (reactive sputtering) Determination of residual contamination	Spectral range: 200-1100 nm Spectral resolution: 0.3-10 nm FWHM