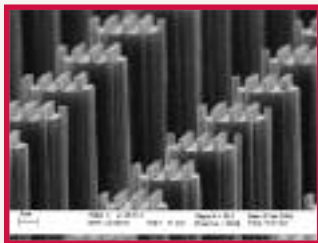


Successful Projects

- Lab-on-a-chip systems
- Custom piezoresistive and capacitive sensors
- Optical and thermal microphones
- MEMS flow sensors
- Micro-preconcentrators
- Retinal micro-tacks
- Micro-needles
- Custom ASIC development
- Micro-hotplates
- Gas sensors
- Retinal electrode arrays
- RFID telemetry circuits
- Spintronics
- Polymer nano-fibers
- Implantable medical micro-devices



Personnel

Cleanroom Manager – Mark Crain
 Director – Dr. Kevin Walsh, Professor of ECE
 Associate Director – Dr. Robert Keynton,
 Chair and Professor of BE
 Assisting Director – Dr. Shamus McNamara,
 Assistant Professor of ECE
 Administrator – Wendy S. Metcalf
 Technical Staff – Don Yeager, Joseph Lake,
 Ana Kieswetter, Scott Cambron

Contact

For more information on available services
 Please contact Mark Crain at (502) 852-1572 or
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Micro/NanoTechnology Center

"innovation through miniaturization"



The University of Louisville Center for Micro/Nano Technology specializes in providing fabrication and design services for numerous MEMS, microelectronic, electro-optic and nanotechnology applications. Services begin at the device design level and continue through single step processing as well as complete device prototyping and small scale production. The Center is housed within two on-campus cleanrooms, the newest of which is a 9,000 square foot, seven-bay, class 100/1000 facility designed by nationally-renown AGI consultants. With one of the widest variety of micro/nano processing tools in the Southeast and over 10 years of operating experience, our state-of-the-art facilities have been utilized extensively by researchers at U of L and other Universities throughout the Ohio Valley regions, as well as industry and government laboratories nationwide. Our enclosed list of process capabilities will assist you in determining how we can best facilitate your micro/nano-technology engineering and research needs.

Process Capabilities

Thin Film Deposition

Evaporation: Thermal and E-beam assisted evaporation of Cr, Au, ITO and many other materials on up to 6" substrates.

Sputtering: RF & DC magnetron sputtering on up to 4" substrates. Cr, Au, Ti, W, TiW, Pt, YBCO, ITO and many others.

Parylene Coating: Vapor Deposition of Parylene C and Parylene N. Parylene deposition provides the capability to conformally coat dielectric and biocompatible layers on fabricated devices.

Molecular Vapor Deposition: Deposition of organic surface coatings used as lubricants, anti-stiction layers, molecular glues, or reactive adhesion layers.

Electroplating: MEMS processing for Cr, Au, Cu, and Ni using the IKO electroplating system.

Thermal Processing

Oxidation and Diffusion: Thermal processes include wet oxidation, dry oxidation, as well as Boron and Phosphorous diffusion.

Rapid Thermal Processes (RTP): For Silicon based gate oxide growth and rapid thermal annealing.

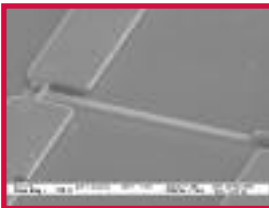
PECVD: For depositing nitrides and oxides.

Lithography

Photomasks: 4", 5", and 6" masks with linewidths down to 1.0 micron produced with the Hiedelberg DWL66 laser pattern generator.

Contact Lithography: For individual die to whole 6" wafers. Our Suss MA6 and AB-M mask aligners also provide back-to-front alignment capabilities. Nanometer resolution e-beam lithography also available.

Maskless Lithography: Intelligent Micro-Patterning SF-100 provides 5 μ m linewidth lithography with direct imaging using a DMD.



Etching, Machining and Bonding

Deep Reactive Ion Etch (Silicon): Silicon DRIE using the Bosch process. Our STS DRIE has pulsed platen bias to minimize "footing" at oxide etch stops.

Anisotropic Silicon Wet Etching: Extensive experience with KOH, TMAH and EDP wet etchants.

MicroMilling: Dover Instruments Ultra-High-Precision Micro Milling Machine is a CNC milling station with nanometer spatial resolution for machining virtually any solid material (i.e. metals, polymers, ceramics, etc.)

Wafer Level Bonding: Suss MicroTec SB6 for Si/glass anodic bonding, glass/glass thermal compression bonding and Si/Si fusion bonding.

Plasma Etching: RIE systems are capable of providing selective silicon, SiO₂ and Si₃N₄ etches, as well as ashing processes.

Xenon Di-Fluoride Etching: Dry anisotropic silicon etching using the Xactix XeF₂ etching system allows for efficient etching of silicon micro-structures prone to stiction.

Miscellaneous: Nano-imprinting, micro-molding, chemical mechanical polishing, ultra-sonic drilling, etc.

Packaging

Dicing: Automated Disco Dicing Saw for silicon, glass, and alternative substrate dicing.

Wire Bonding: K&S wedge, ball, and deep access bonders for aluminum and gold 1-mil wirebonding.

Flip Chip Packaging: Finetech Fineplacer "pico" System for die placement up to 5 μ m. Can handle SMCs up to 17 mm side length.

Printed Circuit Boards: An automated milling system for custom PCB production.

Lapping and Polishing: Lapmaster system is capable of thinning a variety of substrates, as well as final polishing.

Metrology & Test

White Light Interferometer Surface Profiling: Veeco Interferometer provides high resolution, 3D surface measurements, from sub-nanometer roughness to millimeter step heights for all reflective substrates.

3-D Contact Profiling: Veeco Dektak 8 provides down to 7.5 angstrom step height measurements with a vertical range up to 1 mm and a maximum scan length of 200mm. Low stylus forces allow scratch-free measurement of soft materials.

Ellipsometry: Non-destructive measurement technique for determining the thickness and optical constants of single and multi-layer films.

SEM, AFM, STM Capabilities: Various SEMs, AFMs and STMs including nm resolution e-beam lithography.

Testing: Various probe stations and electronic instruments for measuring sheet resistance, TCR, IV, CV, LCR and other semiconductor parameters.

Design, Layout and Modeling

Full suite of computer-based tools for photomask layout, custom analog and digital IC design, micro-scale tooling, and 2D/3D finite element models for virtual device evaluation. Software packages include: Tanner EDA, Silvaco TCAD, CoventorWare®, Solid Edge.

