What the DDL Offers

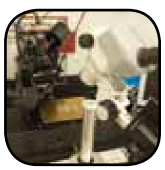
Wet Sector
- Wet benches for solvents and corrosives
- Spin rinse dryers

Reactive Ion Etch
- Fluorine- and chlorine-based tools with dedicated chambers for dry etching of metals and dielectrics

Photolithography
- Contact aligners with front-to-back alignment capabilities
- 2 µm minimum lines/spaces
- Thick and thin resists
- E-beam direct-write lithography

Metal
- Evaporation and sputtering of many materials
- Dedicated chambers for magnetic material and indium deposition

Implant and Deposition
- High-energy implant up to 1 MeV and 1 mA (3 MeV for triple-ionized species)
- PECVD nitride and LPCVD nitride, oxide, and polysilicon



Backend Processing
- Wet and dry release processes for MEMS
- Diamond and laser dicing for singulation
- Wafer lapping, wire bonding, pick and place, flip chip bonding, and wafer bonding

Metrology
- Thin film thickness measurements, profilometry, scanning electron microscopy, and probe station

Contact Information

For process flow approval and scheduling contact:
Thomas Stevenson
Detector Systems
301-286-1221
Thomas.R.Stevenson@nasa.gov
http://detectors.gsfc.nasa.gov/DDL

To set up a Space Act Agreement with NASA's Goddard Space Flight Center, contact:
Ted Mecum
Innovative Partnerships Program Office
301-286-2198
Ted.Mecum@nasa.gov
http://techtransfer.gsfc.nasa.gov

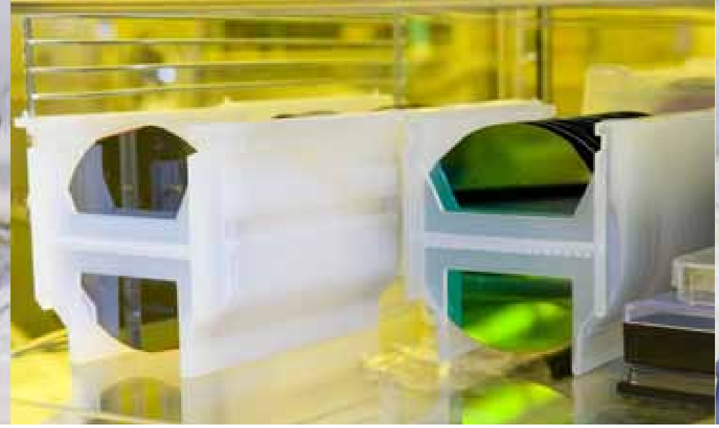
National Aeronautics and Space Administration

How to Work With the **Detector Development Laboratory** at NASA's Goddard Space Flight Center

Gain access to a toolset that can produce innovative detectors and virtually any surface or bulk micro-machined MEMS device

http://detectors.gsfc.nasa.gov/DDL

www.nasa.gov



About the Detector Development Laboratory

The Detector Development Laboratory (DDL), located at NASA's Goddard Space Flight Center in Greenbelt, Maryland, is a 24,000-square-foot, highly advanced, semiconductor fabrication facility, available for use by U.S. companies, universities, and other government agencies for research and development projects.

The DDL is ideal for prototyping and developing semiconductor devices, primarily in the MEMS and nanotechnology realms. After extensive safety and tool training, users are allowed access to a toolset that can produce virtually any surface or bulk micro-machined MEMS device.

The laboratory houses a 4,000-square-foot, class 10 clean room (relative humidity = 38% ± 3%; temperature = 66 ± 2 degrees Fahrenheit) and a 3,700-square-foot, class 10,000 process equipment service area with extensive equipment, offering unique processing capabilities.

Working in Goddard's DDL

The Process

The partnership model for the DDL is that of a users' facility. A company can send personnel to carry out its work alongside Goddard DDL users, working on NASA projects. A Space Act Agreement (SAA) first must be negotiated and set up with your company, and then all of your employees who are designated to use the DDL must go through extensive training in safety and tool usage (see Web site for more details).

Steps

1. Contact Thomas Stevenson to discuss scope, technical feasibility, and the schedule for your project, then develop a statement of work and an estimated cost plan
2. Work with Ted Mecum of Goddard's Innovative Partnerships Program Office to set up an SAA, encompassing the details (billing, facility access, etc) that will allow work to start
3. Have designated employee(s) attend a 2–3-day, safety and lab standard operating procedures training with a DDL safety engineer
4. Have designated employee(s) trained on any specific tools that are necessary for your project
5. Have your workflow plan and materials approved by DDL engineering staff
6. Schedule tool time
7. Begin your project work in the DDL

Bringing New Materials into the DDL

Before bringing a new chemical/material into the DDL, users must get prior approval from the Laboratory Operations and Safety Team (LOST). LOST will review the item to determine its safety for personnel and its compatibility with other chemicals and processes in the DDL.

http://detectors.gsfc.nasa.gov/DDL

MEMS Capabilities

The DDL has all the necessary equipment for both bulk and surface micromachining. Coupled with back-end processing, such as wet and dry release processes and diamond and laser dicing, the DDL can turn bare substrates into singulated and released MEMS devices.

Nanotechnology Capabilities

For nanostructures, a direct-write e-beam lithography system enables patterning of features less than 100 nm in size. Also, nanotube-based devices can be fabricated by using the DDL's nanotube growth furnace.