Facility Description of AggieFab Nanofabrication Facility for Proposal Purposes

(Updated August 14, 2023)

The AggieFab Nanofabrication Facility at Texas A&M University is a shared nano/microfabrication facility located in the Frederick E. Giesecke Engineering Research Building. The facility has over 6,500 sq. ft. of class 100/1000 cleanroom space with a raised access floor and vertical laminar flow and an additional 4,500 sq. ft. of support space, totaling 11,000 sq. ft. The facility was enabled by a $12M investment from the Texas A&M Engineering Experiment Station (TEES). The facility has state-of-the-art equipment for a full range of microscale and nanoscale fabrication on diverse materials. In addition, the facility acquired $5M of new nanopatterning instruments through a donation in Fall 2017 and has received $1.5M from the Texas A&M University Research Development Fund to purchase several new tools to improve micropatterning and advanced substrate development capabilities. In 2021, we received another $1.7M from the Texas A&M University Research Development Fund to purchase new state-of-the-art etching and maskless lithography tools,

The facility houses state-of-the-art microfabrication and nanofabrication equipment and a variety of analytical equipment. The facility has multiple chemical hoods and laminar hoods and is equipped with inhouse deionized water, vacuum, and nitrogen.

The fabrication equipment includes an electron beam lithography system (Tescan Mira 3 EBL), a dual-beam focused ion beam (FIB) nanopatterning tool (FEI Helios DualBeam FIB), a helium ion microscope nanopatterning tool (Zeiss Orion He Ion Microscope/NanoFab), two mask aligners (Karl Suss Microtech MA6 and EVG 610 double-sided mask aligner), Heidelberg MLA150 Maskless Aligner, three spin coaters, a wafer bonder (EVG 501), direct laser write Lithography (Nanoscribe), four physical vapor deposition (PVD) tools (two Lesker PVD75 series electron beam evaporators, one PVD75 DC sputtering system and one PVD75 RF sputtering system), a plasma enhanced chemical vapor deposition (PECVD) system (Oxford Plasmalab 80) system, a low-pressure chemical vapor deposition (LPCVD)system (Tystar Tytan), two reactive ion etching (RIE) systems (one Oxford Plasmalab 100 ICP RIE and one Nordson March RIE CS 1701 RIE), Oxford Estrelas DRIE, two profilometers (Bruker DektakXT and Veeco NT9100), a thin film analysis tool (Ocean Optics NanoCalc DUV), two dicing saws, a wire bonder (Kulicke & Soffa 4500), a wafer bonder (EVG 501), a 3D Microscope (Clustex), an O2 plasma asher (Tegal Plasmaline 421), four oxidation/diffusion furnaces, multiple hot plates, ovens, and chemical hoods. The facility is also equipped with multiple rapid prototyping tools (Universal System PLS6.120D Laser Engraver, Roland MDX-50 benchtop CNC milling machine, and two EnvionTech 3D Printers). The facility also acquired and installed an atomic layer deposition (ALD) tool (ASM P8200 pulsar system) and a parylene coater (PDS 2010 Labcoter2).

Equipment List of AggieFab Nanofabrication Facility for Proposal Purposes

Lithography/Patterning

- EVG 610 Double Sided Mask Aligner
- Nanoscribe Photonic Professional GT2

- Suss MA-6 Mask Aligner
- Heidelberg MLA150 Maskless Aligner
- FEI Helios DualBeam Focused Ion Beam (FIB)
- Zeiss Orion HeIon Microscope/NanoFab
- TESCAN MIRA3 E-beam Writer
- Bidtec SP100 Spin Coater

Deposition/Diffusion

- MTI RTP Anneal Furnaces (3 units)
- Lesker PVD 75 E-Beam Evaporators (2 units)
- Lesker PVD 75 DC Sputter
- Lesker PVD 75 RF Sputter
- Oxford Plasmalab 80 PECVD
- Minibrute Oxidation and Anneal Furnaces
- CLUSTEX 100sp Multi-Target Sputter
- Tystar LPCVD
- ASM P8200/P3000 Atomic Layer Deposition (ALD)
- PDS 2010 Labcoter2 Parylene Coater
- Cressington Gold Sputter Coater

Characterization

- Micromanipulator 6100 Probe Station integrated with an LCR meter
- Veeco NT 9100 Optical Profiler
- Bruker DektakXT Stylus Profiler
- Ocean Optics Thin Film Analyzer
- Veeco FPP5000 Four Point Probe
- Nikon Eclipse LV150N Optical Microscope
- Leica Reichert Polylite 88 Optical Microscope
- Caltex 3D Microscope

Plasma Etching

- Oxford Plasmalab 100 ICP RIE
- Oxford Estrelas DRIE
- Nordson March CS-1701 RIE
- Tegal Plasmaline 421 Asher

Bonding/Dicing

- K&S Wire Bonder
- EVG 501 Wafer Bonder
- Micro Automation Dicing Saw (2 units)

Rapid Prototyping

- PLS6.120D Laser Engraver
- Roland MDX-50 Benchtop CNC
- EnvisionTech Perfactory 3 Mini/Multi-Lens 3D Printer
- EnvisionTech Ultra 3D Printer