SRI International®

AME GEM

On-Shore Trusted Microcircuit Manufacturing

For over 40 years, SRI International's on-site wafer foundry has maintained silicon processing for a diverse array of technologies. SRI's Microcircuit Emulation Wafer Foundry at the Princeton campus provides on-demand manufacturing of microcircuits for the DLA Generalized Emulation of Microcircuits (GEM) and Advanced Microcircuit Emulation (AME) Programs. Our foundry is accredited as a Department of Defense (DoD) Trusted supplier and is audited for conformance to MIL-STD-883 and MIL-PRF-38535.

The wafer foundry occupies approximately 25,000 square feet and has ISO 4 (Class 10) and ISO 5 (Class 100) cleanrooms. The facility uses the MESA WIP tracking system which enables real-time wafer lot tool tracking history. Statistical Process Control (SPC) is implemented in all key process areas and out of control action plans are followed as required. Fully documented procedures and training records are the basis of audited certifications for all staff. The wafer foundry utilizes advanced mainstream semiconductor process equipment systems which are maintained by vendor-trained staff and service contracts as appropriate. The wafer foundry enables technical self-sufficiency, with the capability to perform all processing steps in house.

Technology Node	3.0 µm	1.5 µm	1.2 µm	0.8 µm	0.5 µm	0.35 µm	0.25 µm
Process Technology	CMOS HV CMOS	CMOS BiCMOS HV CMOS	CMOS BiCMOS	CMOS BiCMOS DTI Schottky	CMOS SOI	CMOS	CMOS
Microcircuit Applications	4000/B series, HiNIL, OpAmps	TTL, DTL, UHD, ROM/SRAM, High Speed CMOS, PLAs, PALs, ROM	Digital Logic, Small Micropro- cessor, ASICs, TTL, PLAs, PALs, ROM RadHard	Digital Logic, ASICs, FPGAs, ROM, N-Sub MOS, Schottky, 18K/64K SRAM , ECL 10K	Complex Logic, ASICs, FPGAs, ROM FCT FAST	Complex Logic, ASICs, FPGAs, 256K SRAM, Microprocessor, Microcontroller	Complex Logic, ASICs, FPGAs 1M SRAM, Microprocessor, Microcontroller

In-House Wafer Processing Capabilities

Diffusion	Deposition	Photolithography	Implant	Etch	Metrology
LPCVD, Si_3N_4, TEOS, Poly, Wet/Dry/RH, Oxides	Pt,Ti,TiN,AlCu, Gap Fill SiO_2, Si_3N_4, BPSG, PSG,BSG, Epitaxial Silicon	DUV Stepper, I-Line Stepper	B, BF_2,P,As, (20-200KV), Sb,Ge & Off Angle	Dry & Wet, Metal, Poly,Oxide Silicon, Nitride, Trench, Chemical Polishing	Wafer Inspection, Defect Analysis, Yield Improvement

class 10 to 100 ◆ 25,000 sq ft wafer foundry ◆ computerized WIP tracking system ◆ automated lot tracking and history ◆ SPC manufacturing process ◆ fully documented and audited procedures ◆ dedicated, experienced and skilled operational maintenance, process development, & integration teams ◆ certified operations personnel ◆ maintenance & facilities activities supported by on-site team and service contracts ◆ QML, ITAR and trusted

The wafer foundry maintains several process technologies and absorbs newly developed technologies that transition from the AME development program to the GEM production program. An in-house split manufacturing flow enables creation of base or front-end-of-line processed wafers, where wafers are completed through the majority of the manufacturing flow and held in inventory. For each new design a wafer can be processed through a personalization or back-end-of-line (BEOL) process to create the final microcircuit. The in-house split manufacturing capability enables low-volume high-product mix manufacturing to support customer requirements.

The wafer foundry is configured to process six-inch silicon and silicon-on-insulator (SOI) substrates. Process technologies range within the 3.0 µm to 0.35 µm technology nodes. Technologies include BICMOS, CMOS and Bipolar. In-house process capabilities include ion implantation, chemical mechanical polishing, wet cleans, photolithography, dry and wet etching, thermal treatments, chemical vapor deposition, physical vapor deposition, in-line metrology, and wafer testing.

As Emulation technology advances and incorporates increasing technological diversity and greater reliability, we continually integrate state-of-the-art process equipment and procedural improvements in all maintained and technologies in development. This is critical as it ensures equipment used to support all processing capabilities provides the highest uptime with minimal processing cycle time. These continuing improvements enable the wafer foundry to meet the requirements to support low-volume and high-product mix on-demand manufacturing with high yields.

Our Story

In the late 1980's, DLA recognized that microcircuit obsolescence threatened the readiness of many American defense systems. Numerous systems in the armed forces were designed and developed in the 1960's and 1970's. For example, the U.S. Air Force began flying the F-15 Eagle tactical fighter in 1972, and the U.S. Navy first tested the Aegis phased-array radar at sea in 1973. Because of continued advancements in semiconductor technology, the original suppliers stopped manufacturing the microelectronic components used in these and other systems. In 1987, DLA contracted with SRI to begin research and development on how to best replace obsolete microcircuits with standardized, modern integrated circuits (IC). DLA and SRI collaborated to develop the GEM Program. Using its on-site Trusted semiconductor foundry and deep knowledge of IC design/development, SRI produces on-demand, Class Q microcircuits matching the Form-Fit-Function-Interface (F3I) criteria of the required microcircuit. DLA is developing the next generation of F3I microcircuit Emulation capability through the AME Program to further alleviate growing IC obsolescence issues caused by the continued rapid advancements in technology. The new capabilities developed by AME are utilized by the GEM Program to ensure the Emulation Programs continue to meet weapons systems wide-ranging requirements. SRI's semiconductor foundry is accredited as a Department of Defense (DoD) Trusted Foundry supplier, and our manufacturing processes are qualified to MIL-PRF-38535.