STAR CRYOELECTRONICS

Foundry Services

STAR Cryoelectronics is a leading manufacturer of advanced magnetic sensors based on low temperature superconductor (LTS) and high temperature superconductor (HTS) thin films. Our robust Nb/Al-AlO_x/Nb trilayer Josephson junction process is optimized specifically for the fabrication of Superconducting QUantum Interference Device (SQUID) sensors on wafers up to 150-mm diameter. The standard critical current density is 100 A/cm^2, and all shunt and damping resistors are made using AuPd films, ensuring proper operation at all temperatures, with a standard sheet resistance of 1.3 Ω/□. Other critical current densities and sheet resistances are available upon request.

STAR Cryoelectronics offers foundry services for the fabrication of LTS Josephson junction devices and dc SQUIDs, HTS dc SQUIDs based on a bicrystal Josephson junction technology, custom thin-film microfabrication services, both LTS and HTS, as well as dicing, packaging and characterization services.

Custom thin-film microfabrication capabilities include:

LTS and HTS resonators, pickup loops, and filters.

NbTiN films for Superconducting Nanowire Single Photon Detectors (SNSPDs).

Ta films for superconducting qubits.

LTS and HTS bolometers.

Transition Edge Sensor (TES) detectors.

Superconducting Tunnel Junction (STJ) detectors.

IR windows

Superconducting Flex Cables

Design data may be submitted to STAR Cryoelectronics in GDSII, CIF, XIC, and KIC formats. Please contact STAR Cryoelectronics for process specifications and pricing.

LTS SQUID PROCESS FEATURES

- Robust and reliable Nb/Al-AlO_x/Nb trilayer Josephson junction process for wafers up to 150-mm diameter.
- Junction definition using selective Nb etch process (SNEP), with 3.5 μm minimum junction diameter.
- AuPd resistors.
- Low-temperature, low-stress PECVD SiO_2 dielectric.
- Two Nb wiring layers.
- Standard 100 A/cm^2, 1.3 Ω/□ process; other critical current densities or sheet resistances available upon request.

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FACILITIES

Photolithography

Brewer Science Model 100 Spin Coater
- Auto-dispense primer, three resists

Tek-Vac PRC-2000 Photoresist Cure Station

Fusion Semiconductor M150-PC
- Photoresist UV cure station

AB-M Mask Aligner
- Pattern wafers up to 150-mm diameter
- Backside IR illumination and alignment
- Sub-micron resolution, <0.5 µm alignment accuracy (front side)

Polyimide Cure Station

Thin-Film Deposition

Extensive Materials Capabilities
- Nb, Al, Mo, Ti, Ta, Hf, Zr, W, Au, Ag, Pd, AuPd, Cu, Si, SiO_2, Si_3N_4, NbTiN, NbTi, WTi, MoS_2, Mo/Cu, Bi, AlSi, YBCO, CeO_2

UniFilm PVD-300 Multi-Target Sputter System
- Three rf/dc magnetrons; Ar, O_2, N_2 process gases
- Ion mill for pre-sputter etch and patterning
- Backside heater (up to 700 °C)
- Tooling for 100 mm, 150 mm and 200 mm wafers

Two Lesker Multi-Target Sputter Systems
- Four rf/dc magnetrons, Ar, O_2, process gases
- Load-lock process chamber

Electron Beam Evaporator
- Nb, Ti, Si

Two Thermal Evaporators
- Al, Bi, Pb, In and Sn sources

Ion and Plasma Systems PECVD
- Low temperature, low stress a-Si, SiO_2, Si_3N_4

Thin-Film Patterning

Plasma-Therm 790 RIE
- Etch up to 200 mm wafers
- Configured with CF_4, SF_6, O_2, Ar, C_4F_8, CHF_3

Technics PE-IIA
- Oxygen ash and descum

Ion Technology Ion Mill
- 10-cm Ion Source with Plasma Bridge Neutralizer (PBN)
- Rotatable, tiltable 6" chuck

XeF_2 Polysilicon Etcher

STS Deep Reactive Ion Etcher

Metrology

Dektak III Step Profilometer

FSM 8800 Thin-Film Stress Gauge

Four-Point Probe

Tencor Surfscan 6200

Hitachi S-4800 Type II SEM with EDS

Park Systems NX10 AFM

Back-End Assembly

DISCO DAD-321 Dicing Saw

K&S Models 4523AD and 4129 Deep Access Wedge Bonders (Au ribbon and Al wire)

Unitek UniBond Parallel Gap Microwelder for Nb wirebonding

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