scia systems

scia Mill 200

FULL SURFACE ETCHING ON WAFERS

Features & Benefits

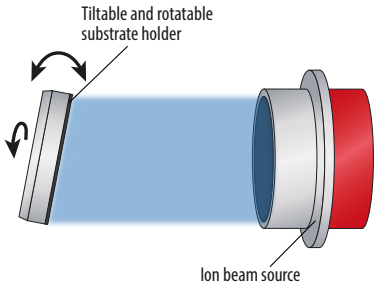
- Etching angle adjustment with tiltable and rotatable substrate holder
- Excellent uniformity without shaper
- Enhanced selectivity and rate with reactive gases
- Process control with exact SIMS based or optical end point detection
- Processing of wafers with photoresist masks due to good wafer cooling
- Fully automatic cassette handling in variable cluster layouts including SECS/GEM communication

Applications

- Structuring of magnetic memory (MRAM) and sensors (GMR, TMR, etc.)
- Structuring of metals, piezoelectric, and dielectric materials (PZT, KNN, AlScN, InP, Cu, Pt, Au, ...), e.g., for MEMS production
- Delayering of multilayer structures for failure analysis
- Patterning of waveguides ($LiNbO_3$, BTO, …) for Photonic Integrated Circuits (PIC)
- Production of slanted surface relief gratings (SRG) for Augmented Reality
- CAIBE of compound semiconductors (GaAs, GaN, InP, …)
- Ion beam smoothing for reduction of microroughness

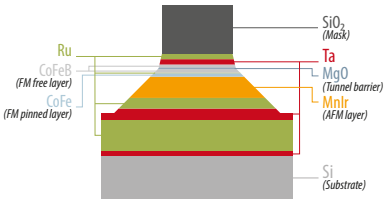
Principle

- Ion Beam Etching (IBE) / Ion Beam Milling (IBM), Reactive Ion Beam Etching (RIBE), Chemically Assisted Ion Beam Etching (CAIBE)
  - Circular ion beam source etches full substrate area under a defined angle with inert or reactive gases

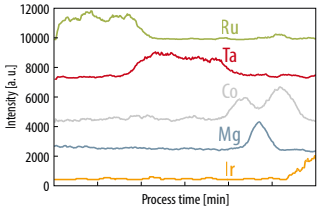


Application Example

- Etching of a layer stack for a spintronic sensor using SIMS end point detection
  - SIMS spectrometry allows to determine the layer change boundaries, thereby changing points for angle and etch stops can precisely be defined



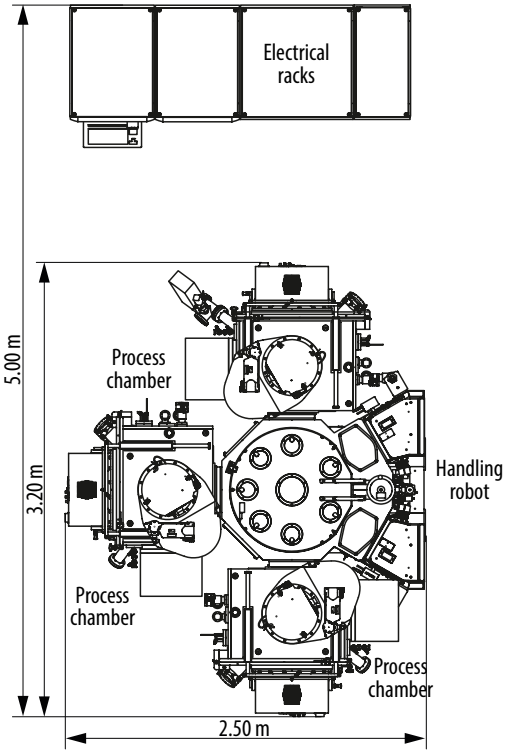
Layer stack for spintronic sensor



SIMS material detection

Technical Data

Substrate size (up to)	200 mm dia.
Substrate holder	Water-cooled, helium backside cooling contact, substrate rotation 1 to 20 rpm, tiltable in-situ from 0° to 170° in 0.1° steps
Ion beam source	350 mm circular RF source (RF350-e)
Neutralizer	RF plasma bridge neutralizer (N-RF)
Typical removal rates	Cu: 60 nm/min, Pt: 35 nm/min, W: 18 nm/min, SiO_2: 20 nm/min (inert), SiO_2: 40 - 60 nm/min (reactive)
Uniformity variation	≤ 1 % (σ/mean)
Throughput	12 Wafer/h (100 nm SiO_2 on 200 mm wafer)
Base pressure	< 5 x 10^{-7} mbar
System dimension (W x D x H)	3.20 m x 2.50 m x 2.50 m, for 3 chambers and cassette handling (without electrical racks and pumps)
Configurations	Single chamber, optional single substrate load lock or cassette handling, cluster system with up to 3 process chambers and cassette handling, optional OES or SIMS based end point detection
Software interfaces	SECS II / GEM, OPC



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