Business in MEMS CORE

MEMS CORE Co., Ltd.
Background of MEMS CORE

Founded by the collaboration of university and company

Esashi Laboratory, Tohoku University
Prof. Masayoshi Esashi
Abundant experiences in MEMS R&D:
technologies accumulated over 35 years

Chemitronics Group
CEO: Koji Homma
Abundant experiences in Semiconductor manufacture equipments:
technologies accumulated over 25 years

Cooperation of technology

Establishment of MEMS Core Co., Ltd.
End of 2001

Original MEMS products
Company profile

Founded: December 2001
Capital: 610 million yen
President: Koji Homma (CEO)
Employees: 30
Sites: Head office and Izumi Factory
            3-11-1 Ake-dori, Izumi-ku, Sendai City, Miyagi Prefecture
Tel: 022-777-8717, Fax: 022-777-8718
Realizing Ideas (user’s)

MEMS CORE Co., Ltd.

Design

Development/Prototype

Trial production, small-lot production

Manufacturing

“Turn ideas into products”

Using

Products

Mass production

External foundry
As a group of hands-on makers creating new-generation MEMS, we turn dreams into reality by flexible development capabilities and creative strengths through keeping a very close relation with the users. We are at your services with various MEMS devices for prototype development.

**Annealing and doping**
- Oxidation furnaces

**Deposition**
- Low-pressure plasma CVD
- Low-pressure plasma CVD
- Metal—organic CVD
- EB deposition
- Three-source sputtering
- Sputtering

**Dry etching**
- RIE
- Deep RIE
- Equipment for dry-etching of sacrificial film
- Ion-milling
- Laser-processing machines
- Plasma ashing
- Glass RIE

**Photolithography**
- Two-plane mask aligner
- Spin coaters
- Pattern generators
- CAD
- Clean ovens
- HMDS coating equipment

**Inspection and measurement**
- FTIR
- SEM
- Measuring microscopes
- Non-contact profilometers
- Optical thickness meters
- Stylus-type profilometers
- Metallurgical microscopes
- Stereoscopic microscopes
- Wafer probers
- Stress meters
- Sheet-resistance meters

**Wet processes**
- Ozone—water etching
- Draft chambers for inorganic work
- Draft chambers for organic work

**Others**
- Equipment for room-temperature plasma processing of surfaces
- UV-cleaning equipment
- Anodic bonding equipment
- Polishing machines
- Dicers
- Plating equipment
- Thermo-compressive bonding equipment
- Sand-blasters

**Utilities**
- Water purification equipment
- Abatement equipment (scrubbers)
- Water scrubber
## Type of service

<table>
<thead>
<tr>
<th></th>
<th>Concept</th>
<th>Detailed design</th>
<th>Prototype</th>
<th>Evaluation</th>
<th>Production (small-lot)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In-house development</strong></td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
</tr>
<tr>
<td><strong>Contract development</strong></td>
<td>![Yellow Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
</tr>
<tr>
<td><strong>Cooperative development</strong></td>
<td>![Yellow Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
</tr>
<tr>
<td><strong>Contract prototyping</strong></td>
<td>![Yellow Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
<td>![Green Bar]</td>
</tr>
</tbody>
</table>

- **: Customer**
- **: MEMS CORE**
- **: Consultation**
<table>
<thead>
<tr>
<th>Items</th>
<th>Technology</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical accelerometer</td>
<td>Laser interference</td>
<td>Seismic monitoring</td>
</tr>
<tr>
<td>RF switch</td>
<td>Magnetic drive</td>
<td>Electric device</td>
</tr>
<tr>
<td>Interposer</td>
<td>Through Silicon Via</td>
<td>3D IC Technology</td>
</tr>
<tr>
<td>Blood glucose sensor</td>
<td>Micro pump</td>
<td>Medical apparatus</td>
</tr>
<tr>
<td>Mirror device</td>
<td>Scanner, Switch</td>
<td>Electric device</td>
</tr>
<tr>
<td>Ultrasonic probe</td>
<td>Capacitive type</td>
<td>Medical apparatus</td>
</tr>
<tr>
<td>Gyro Sensor</td>
<td>Capacitive type</td>
<td>Electric device</td>
</tr>
<tr>
<td>Tactile sensor</td>
<td>Piezo sensor</td>
<td>Robot</td>
</tr>
<tr>
<td>Accelerometer</td>
<td>Capacitive type</td>
<td>Oil Exploration</td>
</tr>
<tr>
<td>Magnetic Heads</td>
<td>Coil</td>
<td>Disk device</td>
</tr>
<tr>
<td>Probe pin</td>
<td>Deep RIE</td>
<td>IC tester</td>
</tr>
<tr>
<td>Nerve electrode</td>
<td>Minute needle processing</td>
<td>Medical apparatus</td>
</tr>
</tbody>
</table>
Stance in MEMS CORE

Basic stance

Responds to a system maker's needs quickly

Customers (Set & System makers)
- System design
- Prototype verification
- MEMS fabrication (prototype)
- Evaluation

MEMS CORE
- Device design
- Prototype verification
- MEMS fabrication (prototype)
- Evaluation

Partners in enterprise
- University
  - Basic technology
- System house
  - System development
- External fab.
  - Mass production

General Customers (Set & System makers)
- Makers of machinery & equipment
- Universities (experimentation)

Order

Products & Delivery
◆ Dry etching of sacrificial layers

Example of processing to etch a sacrificial layer of oxide film

Example of processing for the sacrificial etching of silicon

Example of processing to etch a sacrificial layer of oxide film: cross-sectional view

*Box: Buried oxide
Si DRIE Technology (2)
Laser Dicing

STEALTH DICING

Laser processing

Blade Dicing

STEALTH DICING

TOKYO SEIMITSU CO., LTD.

Hamamatsu Photonics K.K.

STEALTHDICING/SDE are registered trademarks of HAMAMATSU PHOTONICS K.K.
Au Particle Materials Business

- Au particles
  Size: 0.005~0.3µm
  Low-temp. bonding at < 200°C

- Hermetic sealing + electrical interconnect in one process

Service

- Request
- Providing service
  - Bonding
  - Sealing

Application: Device sealing, three-dimensional JISSO
Advantages of MEMS Core:

1. Development Experience of various MEMS devices
2. Using of the accumulated knowledge
3. Support from Tohoku University
4. Exact Quick Customer Service
Access to MEMS CORE

By Sendai Subway Namboku Line from SENDAI to Izumi-chuo (about 16 min)

By taxi from Izumi-chuo to MEMS CORE (about 10 min)

3-11-1 Akedori Izumi-ku Sendai-shi Miyagi-ken 981-3206 Japan
TEL:+81-22-777-8717