



Company Profile

Silicon Carrier
Manufacturer

Carrier Integration Inc.

<<Company Outline >>

Name: Carrier Integration Inc.
Establishment: Dec. 10, 2010
Headquarters : Tsukuba, Ibaraki Prefecture, Japan
Capital : ¥18.5 million
Executives : CEO: Yoshiyuki Amano
 (Four board members)
Main Business : Production and distribution of Silicon Carrier (SC) for various semiconductor processing equipment

- SC for exposure machines
- SC for ion implantation
- SC for etching & film deposition

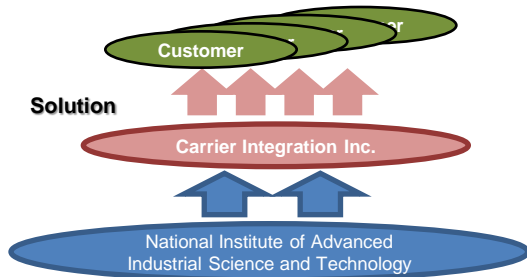
(Advantages for Customers)

- Productivity enhancement in manufacturing process, cost reduction, stable quality

(Markets) Japan, Europe, US, Taiwan, Korea

Offices :
 HQ: 814-1 Uenomuro Tsukuba-shi, Ibaraki, 305-0023 Japan
 R&D Center: Chuou dai-ni, 1-1-1 Umezono Tsukuba-shi, Ibaraki, 305-8568 Japan
 Tokyo Office: 2-1 Ogawamachi Kanda Chiyoda-ku, Tokyo, 101-8475 Japan

<<Business Structure >>

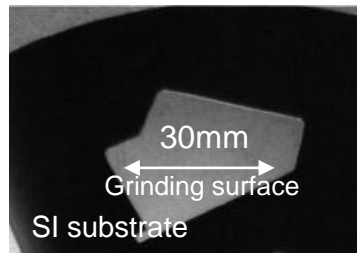


Carrier Integration Inc. is a venture company supported by the National Institute of Advanced Industrial Science and Technology (AIST). The company was established on December 10, 2010, with the aim to provide a solution to the problems of new semiconductor wafers such as power transistors that are much highlighted -- "smaller diameters compared with those of silicon substrates, expensive, and easily cracked, chipped and warped."
 (Certified as an "AIST technology transferred venture company" on July 15, 2011)

Through the provision of integrated wafer technology in the semiconductor industry, we will strive to gain customer satisfaction and trust and make contribution to the development of semiconductor industry and to the society.

<<Technical Features >>

- Brittle material processing by high-speed grinding
 - Silicon, ceramics, glass etc.
- High-precision processing on linear stage
 - Positional accuracy: < 10 μm
- Super-flat processing
 - Surface roughness: < 0.1 μm (Length: 30 mm)
 - Parallelism: 5 μm



High-precision grinding of Si substrate (60,000 rpm)



Processing equipment at HQ plant

<<Main Product: Silicon Carrier >>

- Silicon wafer for conveyance of small-diameter wafers:
 A product made of a SEMI-standard silicon wafer, etc. provided with a cavity and a holding mechanism, designed for holding, carrying and processing Φ1- to 6-inch or 20-mm square compound semiconductor wafers, etc.
- Quick delivery: Available in one week (after specification agreement)
- Customization: Grinding shape tailored to customer's requirements
- Optimum for use in semiconductor research centers and various labs

8-inch SC for exposure machines (for 20-mm square samples)



12-inch SC for ion Implantation (for 3-inch samples)

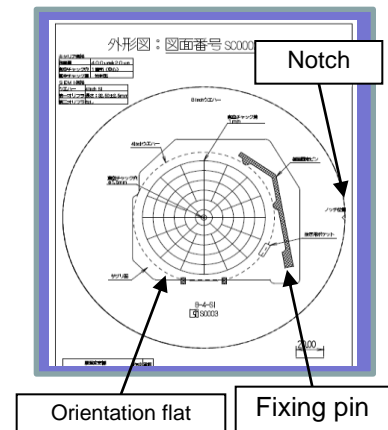
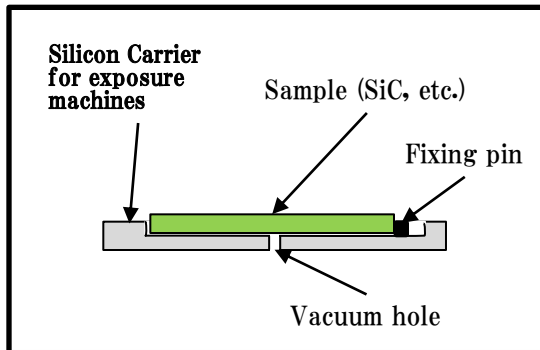


8-inch SC for CVD (for 3-inch samples)



(1) What is Silicon Carrier?

- **A carrier made of a silicon wafer** provides a solution to the problems of new semiconductor wafers such as power transistors - “smaller diameters compared with those of silicon wafers, expensive, easily cracked, chipped and warped.”
- Eliminates the need to modify semiconductor processing equipment
- **Quick delivery:** Available in one week (after specification agreed)
- **Price** (depending on spec. & qty.): Standard price of the product for Lithography Systems: from ¥250,000 and above

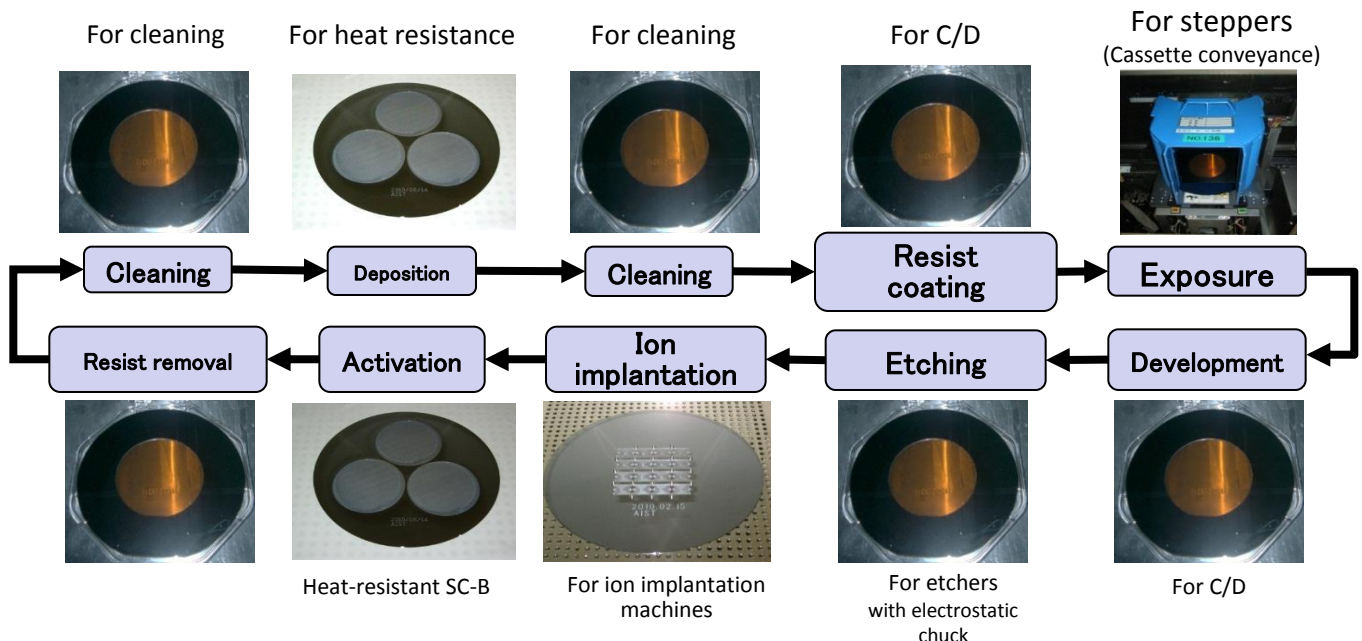


(2) Total Solution for Small-diameter Wafer Conveyance

--- Carrier Method ---

Semiconductor Process & Silicon Carrier

- Silicon Carrier is a system to carry a small-diameter wafer (2 - 6 inches) by mounting it on an equipment-compliant silicon wafer (6 - 12 inches).



(3) Main Technology for Our Carriers

Features of Technology

--- Carrier Method ---

- Silicon Carrier Grinded: SC-G
- Silicon Carrier Bonded: SC-B
- Silicon Carrier Combined: SC-C

● Grinding technology: High-precision, high-flatness processing

- Positional accuracy: <math>< \pm 10 \mu\text{m}</math>
- Parallelism: <math>< 5 \mu\text{m}</math>
- Surface roughness (Ra): <math>< 0.1 \mu\text{m}</math> (Length: 30 mm)
- Freedom in processing materials (Silicon, quartz, ceramics, etc.)

SC-G (Silicon Carrier Grinded)

● Sample alignment & fixation technology

- High-precision θ angle control with accuracy adapted to exposure machine
- Formation of suction hole (provided in exposure machines manufactured by Nikon and Canon)
- Prevents displacement during transport of an exposure machine: Fixing pin
- Metal fixtures, etc. with Teflon coating for ion implantation machines

● Bonding technology: heat resistance & low deformation

- When only grinded, cracking and warpage may occur at high temperatures.
- Our BD is heat resistant (1,000°C) and features low deformation.

SC-B (Silicon Carrier Bonded)

SC-C (Silicon Carrier Combined)

● Combining technology

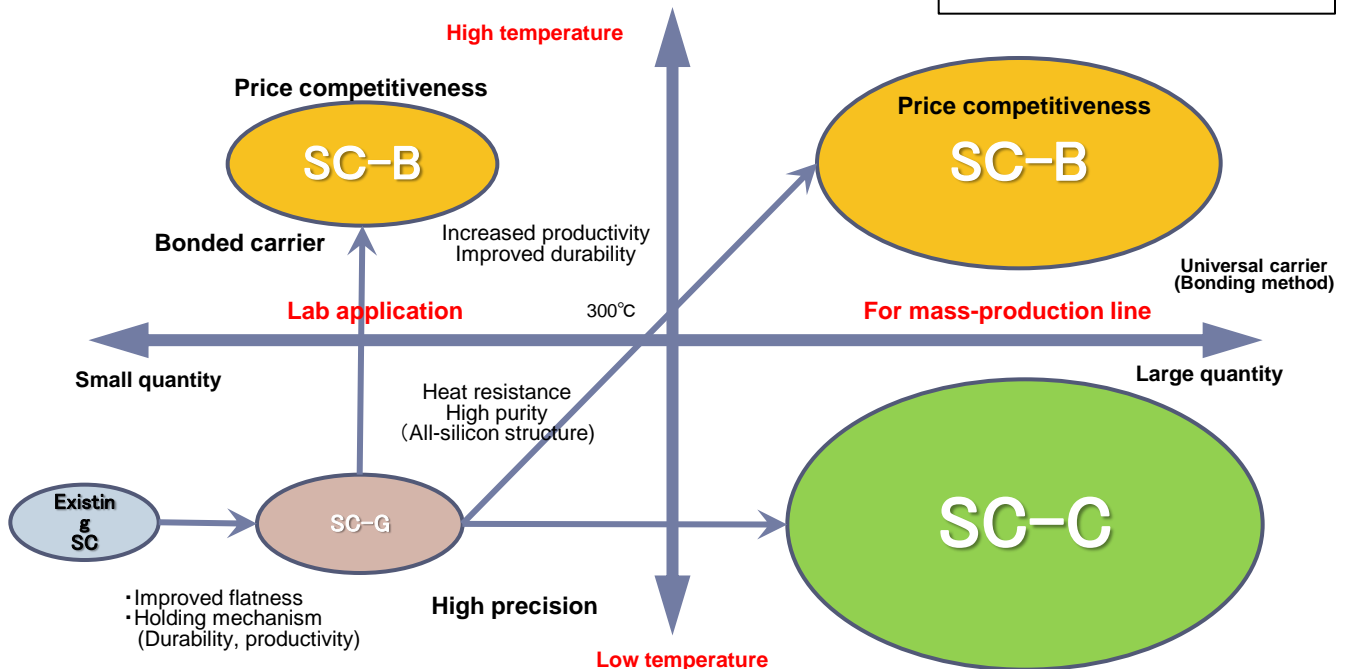
- Allows attachment at 250°C and removal at 400°C. (New polyimide material used)
- Adoption of combining equipment can establish an environment with excellent productivity.

- In addition to technology outlined above, RIE/CVD of wafer surface, high-performance cleaning, etc. are available, as requested.

(4) Application Range of Silicon Carrier

--- Carrier Method ---

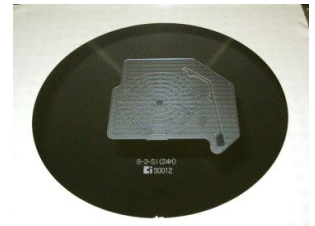
SC-G: Silicon Carrier Grinded
SC-B: Silicon Carrier Bonded
SC-C: Silicon Carrier Combined



Features of Silicon Carrier for Different Uses

SC for lithography systems

- High-precision Θ angle (between crystal orientation of a sample and a notch/orientation flat on Silicon Carrier)
- Ensured flatness
- Holding mechanism for conveyance
- Freedom in sample sizes
SEMI, JEIDA wafers measuring 5-, 10-, 20-, 30-mm square, etc.
- Enables reuse of wafers broken during processing.



SC for exposure

SC for Ion Implantation Machines

- Batch mounting of small chips and small-diameter wafers
- Prevents metal contamination by the use of Teflon fixtures.
- Option: Socket structure against acceleration (2 G)
- Option : All-silicon structure by silicon bonding



SC for ion implantation machines

SC for High-temperature Annealing

- Reduced stress strain at high temperatures
- Improved durability by silicon surface processing

SC for CVD

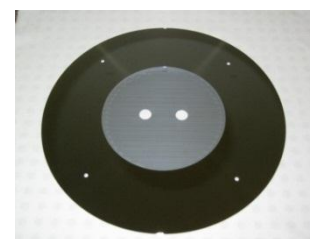
- High-purity material selected: Holding mechanism with Teflon cover
- High-purity cleaning



SC for CVD

Customized Processing

- Processing of non-silicon materials also available, as requested.
- Processing of complicated structures also possible.
- Processable materials:
Metals, glass, minerals (quartz, granite, etc.), ceramics, semiconductor wafers (silicon, SiC, GaAs, etc.)



SC for bonding