News Release

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Nissin Electric Co., Ltd.
Nissin Ion Equipment Co., Ltd.

Commence Delivery of Ion Implanter for Semiconductor IMPHEAT-II —Productivity Increases Approximately Threefold in Response to Expansion of SiC Power Semiconductor Device Market—

To respond to the expansion of the market for silicon-carbide (SiC) power semiconductor devices, which are expected to be increasingly used for electric vehicles and information communications equipment, Nissin Ion Equipment Co., Ltd., a group company of Nissin Electric Co., Ltd., has commenced delivery of IMPHEAT-II, an ion implanter for semiconductors whose productivity has increased approximately threefold compared to conventional implanters.

As a material for power semiconductor devices that control and supply electric power, SiC has superior characteristics to silicon (Si), such as significantly low power loss and high-temperature performance. Therefore, companies and other organizations in the fields of electric trains and vehicles and information communications equipment expect that SiC devices will be mass produced on a full scale, as they will become potential next-generation power devices that will help reduce the size and improve the performance of equipment.

Due to SiC's characteristics, when ions are implanted in a SiC wafer, it is necessary to heat it at a high temperature (approximately 500°C). Applying the advanced technologies accumulated in manufacturing medium current ion implanters for memory ICs (memory elements), logic ICs (logic elements) and other very large scale integration (VLSI) circuits, Nissin Ion Equipment developed an ion implanter for semiconductor for research use in 2009 as the first step. In 2013, the company released the IMPHEAT, the only mass-produced ion implanter for semiconductors at that time, ahead of others, and sold it to advanced power semiconductor device manufacturers.

After that, since the market for SiC power semiconductor devices is expected to further expand against a background of an upsurge of energy-saving, electricity-saving and environmental needs, in response to manufacturers' needs for mass production, Nissin Ion Equipment developed and started selling the IMPHEAT-II in 2019, which has shortened the processing time and increased the throughput (the number of wafers processed per hour approximately threefold compared to the conventional implanter by adding several improvements, including optimization of the structure of the automatic transfer system and other systems and doubling of the ion beam current.

[Features of IMPHEAT-II]

- Throughput: 100 wph [wafers per hour] (approximately trebled compared to the conventional implanter)
- Ion beam current: 4 mA (approximately doubled compared to the conventional implanter)

The company will expand its sales to leading SiC power semiconductor device manufacturers not only in Japan but also around the world. Furthermore, using a demonstration machine at its Kuze Works (Minami-ku, Kyoto City), Nissin Ion Equipment provides customers that have already been using the IMPHEAT as well as new customers to which the IMPHEAT has not yet been delivered, and potential customers that are considering entering the power semiconductor device market with ion implantation and performance evaluation services that meet their needs, thereby further expanding its sales.

IMPHEAT-II