

## Nissin Ion and SemEquip Announce the Launch of New Ion Implanter based on ClusterIon® Technology

Significant improvement of Productivity in the formation of ultrafine ultra shallow junctions for high density transistors

Nissin Ion Equipment Co., Ltd. (Kyoto, Japan; a subsidiary of Nissin Electric Co., Ltd.) recently announced the introduction of a new category of ion implanter, named CLARIS®, and has shipped the first tool to a major Japanese chip manufacturer. This tool uses patented ClusterIon® technology from SemEquip (Billerica, MA; a subsidiary of Ceradyne, Inc.) to enable the high beam current implants with ultra low energies below 300eV which are required for the formation of ultra shallow junctions less than 9nm deep. No conventional ion implanter has ever yet achieved comparable performance, and such a breakthrough has been eagerly anticipated by the world's leading semiconductor manufacturers in order to produce future generations of high density semiconductor devices. CLARIS® went on sale from December 2008.



### Background

Moore's Law continually drives demand for higher densities due to the increasing degree of integration of semiconductor devices. Ion implantation is used for putting the dopants into transistors, and must satisfy the technology of the 45nm node, already entering mass production, and beyond. Due to today's need for compact and slim electronics, transistors have become smaller and shallower in both lateral and longitudinal directions. Conventional ion implant tools take too long to implant sufficient low energy ion doses into ultra shallow regions and have thus become unproductive.

Moreover, it has become difficult to achieve consistent transistor characteristics because of beam divergence at low energies.

### ClusterIon® Implantation

ClusterIon® is a breakthrough technology from SemEquip that is used to implant ion beams into ultra shallow regions. The ClusterIon® is an ionized cluster, which consists of a molecule containing multiple dopant atoms, such as the 18 boron atoms in Octadecaborane ( $B_{18}H_{22}$ ). The energy per cluster atom is very small, so a large number of atoms can be focused and injected. Nissin Ion originally worked under a commission from JST (Japan Science and Technology Agency) in 2002, to develop fundamental technology for a 'Decaborane Ion Beam Formation Tool', utilizing Decaborane molecules ( $B_{10}H_{14}$  - a cluster of 10 Boron atoms). Based upon this development, they then adopted technology from SemEquip to create the CLARIS® tool, which uses both decaborane and octadecaborane.

CLARIS® is the world's first implanter to scan a ClusterIon® beam at high speed. It achieves ultra low energies below 300eV and precisely controlled implant processes with high beam currents at greater than 50 wafers per hour, beyond what other conventional tools can offer. CLARIS® also provides superior stability, high productivity and excellent controllability.

Commented Brian Cohen, CEO of SemEquip: "We have been looking forward to this day since establishing SemEquip in March 2000. We are confident that leading-edge semiconductor manufacturers will find compelling advantages in the adoption of ClusterIon® technology, and we eagerly anticipate more exciting developments from other ClusterIon® materials already in the pipeline."

CLARIS® is a trade mark of Nissin Ion Equipment Co., Ltd.  
ClusterIon® is a trade mark of SemEquip (a Ceradyne company).

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