SEMEQUIP ION SOURCE PERFORMANCE

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We will report on the development of a new style of ion source that generates production worthy beam currents of As^+ and P^+ as well as decaborane ions. The operational characteristics of the SemEquip ion source such as beam current, noise, stability, and optical quality of the beam will addressed. Data generated from 100 eV to 40 keV; B, As P, Ar, Sb, and In beams will be used to illustrate the universal nature of the source. Mass scans and Secondary Ion Mass Spectroscopy have been utilized to demonstrate the cleanliness of the beam. Run-to-failure tests have shown that the SemEquip source is production worthy. This new source is based on a proprietary design, which offers superior beam quality and distinct advantages to next generation IC manufacturing.

The problems associated with extracting low-energy ion beams, such as the space charge effects governed by Child's Law, have traditionally been mediated by utilizing molecular ions such as BF_2^+. Recent developments[1,2] using large clusters and molecules such as decaborane have been of keen interest to the ion implant community. This proposed use of clusters is timely, since as devices continue to shrink, and required implantation energies continue to scale with the device dimensions. With the SemEquip source, the low energy requirements for B implantation and traditional n-type implantation can be accomplished with the same source. This development will help ion implantation continue to thrive as the premier doping process as IC manufacturing continues to plunge deeper into the nanoworld.

1. D. Takeuchi,et al. "Shallow junction formation by polyatomic cluster ion implantation", Nucl. Instrum. and Meth. B 121, 345, (1997).

2. D.C. Jacobson et al. "Decaborane, an alternate approach to ultra low energy ion implantation", Ion Implantation Technology-IIT2000 International Conference, Alpbach, Austria, September 2000.