Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Recent developments for low energy extreme of ion implantation[1]

ADY HERSHCOVITCH, Brookhaven National Laboratory — Since the invention of the transistor, the trend has been to miniaturize semiconductor devices. Consequently, the technology has been focused on the formation of shallower junctions, and thus lower energy implants. Current density limitation associated with low energy ion beams result in lower beam currents that in turn adversely affects the process throughput. R&D effort has been on mitigating space charge limitations associated with low energy semiconductor ion implantation by developing boron and phosphorous cluster ion sources, and novel deceleration techniques that overcome space limitations. Presently our focus is on carborane ($C_2B_{10}H_{12}$) ions, which are the most stable of the molecular boron ion currently being pursued. Simultaneously, a pure boron ion source was developed that can form the basis for a novel, more efficient, plasma immersion source. And our Berna-Calutron ion source, which in the past produced record currents of steady state high charge phosphorous has been generating molecular phosphorous P_4^+ that is gas fed. As such the Berna-Calutron has become a universal source capable of switching between generating molecular phosphorous P_4^+, high charge state ions, as well as other types of ions. Various results will be presented at the conference.

[1]Work supported by US Department of Energy

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Date submitted: 03 Jul 2011 Electronic form version 1.4