

Ion Implantation Services for Boron and Phosphorous Doping

The NanoFab strongly suggests that for doping, that ion implantation services be used instead of diffusion. The quality of the electrical properties of doped area is much better, the doped area is much more confined, and it is typically much less expensive than diffusion doping in either your lab or the NanoFab.

The cost for doping 8 wafers is \$1000, with the cost remaining constant, if more wafers are implanted. Turn around times are 3 to 5 days (1 day is possible, but it costs more).

The NanoFab, also strongly suggests, that for piezoresistive devices that boron doping be used. This is extremely common in research and in industrial products, because Aluminium will form a high quality ohmic junction with boron doped Si. For Phosphorous, two implants are needed, one for the piezoresistor and the second to make the junction (the second has a much higher doping concentration).

NOTE:

- 1) Implants are specified by atoms/cm² on the surface. The heat treatment will determine junction depth and surface conductivity.
- 2) The NanoFab also strongly suggests you read about doping and device formation before designing a device or getting implant done. There are a number of subtle issues to understand. This information is in many books on semiconductor device physics (also taught as a 4th year EE course)

Service Companies (in no particular order)

- 1) Core Systems (www.coresystems.com) – Sunnyvale CA

Their website contains all the information required to submit wafers and specification on their abilities. It is a very good web site. They have both mid and high current implant systems and can implant from 10 keV to 200 keV (higher the keV, the deeper the implant)

- 2) Innovion Corp (www.innovion.cc) (Note the .cc in the web address) – San Jose CA

Their website contains all the information required to submit wafers and specification on their abilities. It is a very good web site. They have both mid and high current implant systems and can implant from 10 keV to 200 keV (higher the keV, the deeper the implant)

Both companies have been used for boron doping of 4" wafers. The NanoFab users were happy with the results from both companies.