

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Performance optimization of diffused Li on Ga/In eutectic, In/Sn solder and eutectic Ga/In Ohmic contacts to n-high purity-crystalline (100) Ge KHIZAR KHAN, YANG GANG, GUOJIAN WANG, WENCHANG XIANG, YUTONG GUAN, DONGMING MEI, Department of Physics, University of South Dakota, Vermillion, SD 57069 — Performance optimization study of novel contacts such as diffused lithium on Ga/In eutectic (75.5/24.5 wt%), In/Sn solder (95.0/5.0 wt%) and Ga/In eutectic (75.5/24.5 wt%) to n-high purity-crystalline <100> Ge (HP-SC-Ge) has been presented. Ultrasonically clean samples taken from same substrate were used to process the contacts followed by their characterization utilizing current–voltage (I–V), Hall-effect and AFM measurements. Extreme care was introduced to minimize the effect of parasitic oxide layers. Contacts such as diffused Li on eutectic Ga/In and In/Sn solder were processed in an inert glove box and characterized at 305 K (RT) and 77 K (LN) respectively. Comparative study revealed that Ga/In eutectics contacts behave throughout linear and stable, showing strong hall-effect to that of its counter parts. This was attributed due to the high adsorption behavior of anions at liquid (Ga–In) contacts and improved wettability. Whereas, for In/Sn solder case, the contacts processing considerations were substantially different, mainly because of its poor solder flow, excessive void formation, and heterogeneous phase distribution responsible for process yield loss. For diffused Li on Ga/In eutectic contacts, the linearity of the obtained Ohmic profiles was not consistent due to the high reactivity of the Li with HP-SC-Ge substrate. This work is supported by DOE grant DE-FG02-10ER46709 and the state of South Dakota.

Khizar Khan
Department of Physics, University of South Dakota, Vermillion, SD 57069

Date submitted: 10 Nov 2011

Electronic form version 1.4