Low resistive thermally stable metal-semiconductor contact on n-GaSb using n-InAsSb as contact layer

S. Priyabadini, S. Arafin, A. Bachmann, K. Kashani-Shirazi, R. Singh and M.-C. Amann*

Walter Schottky Institut, Technische Universität München,

Am Coulombwall 3, 85748 Garching, Germany

*Physics department, Indian Institute of Technology Delhi,

Hauz Khas, New Delhi-110016, India

In this work, we present low resistive and thermally stable ohmic contacts to MBE grown Te-doped n^+-$InAs_{0.91}Sb_{0.09}$ layers which is lattice matched to *n*-GaSb. This configuration is suitable for GaSb-based VCSELs which has some applications with great potentiality like trace gas sensing and so on. In fact, a low resistive ohmic contact is extremely important for these lasers in getting the desired operation. But it is challenging to obtain an high quality ohmic contact on this material system due to its rapid oxidizing property[1]. So, special surface treatment procedure by the sulphide passivation[2] in addition to conventional HCl dipping was involved to remove the native oxides and thus the surface becomes unreactive to the ambient conditions. Finally Ti/Pt/Au metals are evaporated on the semiconductor at the top and bottom side. Thus, we achieve the linear current-voltage (*I-V)* characteristics over a very high current density range like ± 70 kA/cm^2 which is an adequate value for the operation of GaSb-based VCSELs above the threshold current. The contact resistivity is as low as $5.1 \times 10^{-6}\,\Omega\,cm^2$ without any annealing. The thermal stability of this contact was also checked and no deterioration was observed up to the annealing temperature, 380°C.

References

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Corresponding author, E-mail: skpriyabadini@gmail.com

Telephone No.: +49(0)89-28912788, Fax: +49 89 3206620