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Influence of the InAs/GaSb super lattice period composition on the electro-optical performances of T2SL infrared photodiode

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The last past years, Type-II super lattice (T2SL) made of InAs/GaSb nanostructures has emerged as a new material technology suitable for high performance infrared detectors. This was possible because T2SL is a particular quantum system with non-standard optical and electrical properties. Among T2SL specific properties, one of the main interesting properties is that several structures, with different InAs to GaSb thickness ratios in each SL period, can target the same cut-off wavelength. Recent previous work reports the study of photodiodes with different SL periods having the same cut-off wavelength at 5 μm at 77 K. This study shows the strong influence of the SL composition on dark current measurements, shape of spectral responses, quantum efficiency and type of background doping concentration of n-doped InAs/GaSb SL active zone. The objective of this communication is to use the flexibility of T2SL to fabricate by MBE a pin photodiode where the active zone is made of different SL periods. Influence of the SL period composition on the electrical and electro-optical characterizations are reported and discussed. The results show that optimized SL structure for the MWIR domain can be designed by combining the best of each SL periods.

Biography

P Christol is a Professor of Electronic and Electrical Engineering at the Electronic Institute (IES) of Montpellier University, France, since 2005. He is specialist of infrared photodetection, in particular of antimonide-based photodetectors grown by Molecular Beam Epitaxy (MBE) on GaSb substrate. He is now Deputy Director of the IES laboratory (~200 people). He is author/co-author of over 80 publications in refereed journals, a book chapter and contributed to over one hundred communications in international conferences. He has supervised 15 PhD students in the past ten years. His research interests currently focus on electrical and optical properties of new InAs/InAsSb and InAs/GaSb superlattice infrared photodiodes.

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