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Epitaxial Integration of GaSb-based mid-IR devices on Silicon

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Sb-based materials rely on the GaSb, InAs, AlSb, InSb binary compounds and their quaternary or pentanary alloys (AlGaAsSb, GaInAsSb, AlGaInAsSb,...). This technology exhibits several distinctive properties as compared to other semiconductors: type-I to type-III band alignments, giant band offsets, low effective masses of electrons and holes, direct bandgaps between 0.15 and 1.7 eV. They are particularly well suited to the development of mid-IR optoelectronic devices for sensing applications. The evolution toward smart, integrated, sensors requires integrating GaSb-based optoelectronic devices on Si-based platforms. We have demonstrated a variety of epitaxially integrated optoelectronic devices such as laser diodes, photodetectors and the first ever QCL grown on Si. In this presentation we review the recent results obtained on the integration of antimonide-based optoelectronic devices epitaxially grown on Si substrates. We will show that this technology is very attractive for future III-V on Si integration, and we will discuss future integration schemes

SHORT BIO:

Eric Tournié is a Professor of Electrical Engineering at Université de Montpellier (F) where he leads the mid-IR research group of Institut d' Electronique, UMR CNRS 5214. His current work focuses on the epitaxial integration of GaSb-based devices on Si platforms. From 1990 to 1993 he was with the Max-Planck-Institute in Stuttgart (D), working on InAs-based highly-strained heterostructures on InP and GaAs substrates. In 1993 he joined CRHEA/CNRS, Valbonne (F), to work on ZnSe-based heterostructures for blue-green lasers. In 1999 he initiated a program on GaInNAs heterostructures for telecom applications. He has been appointed as a Professor by U. Montpellier in 2002. E. Tournié is a member of the Program Committee and/or Int. Advisory Committee of the Int. Conf. on Mid-Infrared Optoelectronics: Materials and Devices (MIOMD), Int. Molecular-Beam Epitaxy conference (MBE), Int. Symposium on Compounds Semiconductors (ISCS) conference series. He chaired the ISCS 2014, MIOMD 2014 and IC-MBE 2016 conferences. E. Tournié has published more than 250 papers in refereed journals and gave more than 60 invited conferences.