黄昆半导体科学技术论坛

**第343期讲座**

**报告题目:Antimonide-based devices: the infra-red optoelectronics toolbox**

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**Abstract：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.**

**Conventional laser diodes (LDs) rely essentially on GaInAsSb type-I quantum wells (QWs) confined by AlGa(In)AsSb barrier layers. Low threshold currents and high T0 have been demonstrated between 1.5 and 3.4 μm. Single mode operation has been achieved with both DFB lasers and VCSELs using the same active zone. At longer wavelength, interband cascade lasers (ICLs) based on GaInSb/InAs type-II p-n junctions stacked in series exhibit room temperature cw emission between 3.5 and 5 μm, including single mode operation of DFB lasers. At still longer wavelength InAs/AlSb quantum cascade lasers (QCLs) benefit from the low InAs effective mass and giant conduction band offset. High performance have been demonstrated all the way from 2.6 μm up to 25 μm, particularly at long wavelength which is an asset of this technology. In thispresentation we review the properties of the Sb-based materials and devices, as well as their potential integration on Silicon.**

**Biography：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.**

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