Olivier Durand

499 connections

Professor, INSA-Rennes, Head of FOTON-OHM lab
Rennes Area, France | Think Tanks

Current INSA-Rennes
Previous Thales Research and Technology France, Institut INESC (Portugal), Thales research and Technology France
Education Université Paris VII

Experience

Professor
INSA-Rennes
September 2007 – Present (9 years 10 months)

Head of FOTON-OHM lab

Research engineer
Thales Research and Technology France
1995 – 2007 (12 years)

Thin Solid films analyses (oxides-semiconductors-metallic multilayers)
X-ray diffraction and Atomic Force Microscopy

Post-doc position
Institut INESC (Portugal)
1994 – 1995 (1 year)

Spintronics

PhD
Thales research and Technology France
1991 – 1994 (3 years)

Spintronics

Projects

French ANR Project OPTOSI
Starting November 2012

SIlicoN PHOtonics with diluted NItride Coherent integration. OPTOSI aims at demonstrating the monolithic integration of III-V optoelectronic devices on Si wafers with an emphasis toward Si photonics applications. The work programme is based on the investigation and evaluation of the direct molecular-beam epitaxy

Team members: Olivier Durand, ies-Montpellier, LPN, III-Vlab, LPCNO

Skills

Physics | Nanotechnology | Materials Science | Characterization | Silicon Photonics | Photovoltaics | Semi-conducteur | Physique | Science des matériaux | Research

Caractérisation Nanotechnologie Optics Science Matlab Couche mince
R&D

Publications

Density Functional Theory Simulations of Semiconductors for Photovoltaic Applications: Hybrid Organic-Inorganic Perovskites and III/V Heterostructures

International Journal of Photoenergy, Volume 2014, Article ID 649408

June 2014

modeling of the structural and optoelectronic properties of semiconductor hybrid organic-inorganic perovskites and GaAs/GaP heterostructures.They show how the properties of these bulk materials, as well as atomistic relaxations, interfaces, and electronic band-lineups in small heterostructures, can be thoroughly investigated. Some limitations of available standard DFT codes are discussed. Recent improvements able to treat many-body effects or based on density-functional perturbation theory are also reviewed in the context of issues relevant to photovoltaic technologies

Authors:
Jacky Even, Laurent Pedesseau, Eric Tea, Samy Almosni, Alain Rolland, Cédric Robert, Jean-Marc Jancu, Charles Cornet, Claudine Katan, Jean-François Guillemoles, Olivier Durand

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Design of a lattice-matched III–V–N/Si photovoltaic tandem cell monolithically integrated on silicon substrate

Opt Quant Electron 46 (2014)

February 2014

In this paper, we present a comprehensive study of high efficiencies tandem solar cells monolithically grown on a silicon substrate using GaAsPN absorber layer. InGaAs(N) quantum dots and GaAsPN quantum wells have been grown recently on GaP/Si susbstrate for applications related to light emission. For photovoltaic applications,we consider theGaAsPN diluted nitride alloy as the top junction material due to both its perfect lattice matching with Si and ideal bandgap energy for current generation in association with the Si bottom cell. Numerical simulation of the top cell is performed. The effect of layer thicknesses and doping on the cell efficiency are evidenced. In these structures a tunnel junction (TJ) is needed to interconnect both the top and bottom sub-cells. We compare the simulated performances of different TJ structures and show that the GaP(n+)/Si(p+) TJ is promising to improve performances of the current–voltage characteristic

Authors:
Alain Rolland, Laurent Pedesseau, Jacky Even, Samy Almosni, Cedric Robert, Charles Cornet, Jean Marc Jancu, Jamal Benhlal, Olivier Durand, Alain Le Corre, Pierre Rale

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Theoretical study of optical properties of anti phase domains in GaP

J. Appl. Phys. 115, 063502 (2014)

III-V/Si heterostructures are currently investigated for silicon photonics and solar energy conversion. In particular, dilute nitride alloy GaAsPN grown on a GaP/Si platform exhibits lattice match with Si and an optimal band gap configuration for tandem solar cell devices. However, monolithic “coherent” growth of the GaP thin layer on Si suffers from the nucleation of extended structural defects, which can hamper device operation as well as the GaP/Si interface level and through their propagation inside the overall heterostructure. However, the effect of such structural defects on optical and transport properties is actually not well understood in details. In this letter, we investigate the anti phase domains defect (also called inversion domains) by means of ab initio calculations giving insights into the alteration of optical and transport properties of GaP due to the defective GaP/Si interface

Authors: Olivier Durand

Strain-induced fundamental optical transition in (In,Ga)As/GaP quantum dots

Appl. Phys. Lett. 104, 011908 (2014)

January 2014

The nature of the ground optical transition in an (In,Ga)As/GaP quantum dot is thoroughly investigated through a million atoms supercell tight-binding simulation. Precise quantum dot morphology is deduced from previously reported scanning-tunneling-microscopy images. The strain field is calculated with the valence force field method and has a strong influence on the confinement potentials, principally, for the conduction band states. Indeed, the wavefunction of the ground electron state is spatially confined in the GaP matrix, close to the dot apex, in a large tensile strain region, having mainly Xz character. Photoluminescence experiments under hydrostatic pressure strongly support the theoretical conclusions.

Authors: Olivier Durand

Education

Université Paris VII

DEA Physique des solides

1990 – 1991

Institut national des Sciences appliquées de Rennes

Université du Maine, Le Mans

Groups

Silicon Photonics an... **Photonics Research...** **EPIC Photonics** **Green Photonics**

Gallium Nitride Semi...