Juan Jiménez López
Cv resumido

Physics degree by the University of Valladolid (1975). PhD by the University of Valladolid (1979), and by the University of Montpellier (1981). Full professor and head of the research group GdS Optronlab since 1993. My PhD work was devoted to the characterization of semiinsulating GaAs using thermally stimulated currents. My PhD by the University of Montpellier was devoted to the study of transport in a relaxation semiconductor. In my posterior incorporation to the University of Valladolid I worked on the photocurrent characterization of semiinsulating GaAs, and in particular in the study of metastable state associated with the defect labeled EL2, one of the most studied defects of the physics of semiconductors. In 1986, I started the investigation in Raman spectroscopy. Simultaneously, I started to move to the study of defects at the microscale, combining optical and electrical techniques with optical microscopy, In this context, I developed some experimental techniques as light beam induced current (LBIC) applied to the study of iron doped InP wafers, and years later it was applied to the study of multicrystalline solar cells. Along my career, I have studied different semiconductors, both bulk and nanostructured, Si, SiGe, InP, GaP, AlGaAs, ZnO, GaN, GaO_3,among other. In the last years, I focused on nanostructures, in particular semiconductor NWs, waveguides, and semiconductor devices, among these, solar cells and high power laser diodes. In the case of the laser diodes, I have studied the degradation under operation, in particular, the catastrophic optical damage (COD). The characteristic defects associated with the COD were revealed by cathodoluminescence. In parallel, a thermomechanical model was developed in order to describe the COD event. The study of semiconductor NWs was focused on the light/NW interaction, considering the influence of the NW diameter, the substrate, the light wavelength and the NW composition. The experimental part was carried out by microRaman spectroscopy, and modelling of the electromagnetic field distribution was carried out solving the Maxwell equations by COMSOL multiphyics. Then, I have studied heterostructured NWs, where we have revealed a resonance effect at the heterojuntion, evidencing that microRaman spectroscopy is a powerful experimental tool for studying axially heterostructured NWs.
Regarding solar cells, we have developed characterization techniques as LBIC and photoluminescence and electroluminescence imaging. Especially interesting has been the development of a daylight system of Photoluminescence/ Electroluminescence, suitable for the inspection of solar plants under sun radiation
I have a very active network of international cooperations: IMEM-CNR (Parma, Italy). Universita´di Parma, Max Born Institute-Berlin, Université de Nantes, Université de Rennes, Université de Bordeaux, Université de Grenoble Alpes, Technical University of Wien, Humboldt University, Universitá di Bologna, Lawrence Berkeley Lab, Air Force Research Laboratory in Hanscom and Dayton, KTH-Sthockolm, among others. We have cooperated with numerous companies: DC Wafers-Spain, Pevafersa- Spain, Thales-France, III-V Res. Lab.- France, Solar Force- France, Alcatel-France, 3SPhotonics- France, Coherent-Germany-Finland.
I have participated in five European projects of different programs, eleven National projects, 7 projects funded by Junta de Castilla y León, and five projects funded by the European Office for Research and Development (EOARD), which is the European branch of the Research Office of the US Air Force. Also several contracts with companies: ·3S Photonics, Alcatel, Thales, Coherent, Pevafersa, DC Wafers, Enertis, Solar Force. All this funding has allowed to set up a performant laboratory equipped with powerful techniques for the characterization of semiconductors and semiconductor nanostructures.
My research career can be summarized in 384 articles in peer reviewed journals, 5 books, 3 book chapters, 14 PhDs supervised, 22 Invited talks in Conferences, and a high number of seminars. Hirch index H28 (Google Scholar), and i10 index 90 (Google Scholar)
Some selected articles

1. Thermomechanical issues of high power laser diode catastrophic optical damage; J. Souto, J.L. Pura, J.Jimenez; J. Phys. D 52, 343002 (2019) This article is a Topical review invited by the editorial committee.
2. Growth dynamics of SiGe nanowires by the Vapour Liquid Solid method and its impact on SiGe/Si axial heterojunction abruptness; J. L. Pura, P. Periwal, T. Baron, J. Jiménez; Nanotechnol. 29, 355602 (2018). This paper models the heterointerfaces in axially heterostructured Si/SiGe NWs in terms of the growth parameters.
3. Electromagnetic field enhancement effects in group IV semiconductor nanowires. A Raman spectroscopy approach; J. L. Pura, J. Anaya, J. Souto, A. C. Prieto, A. Rodríguez, T. Rodríguez, P. Periwal, T. Baron, J.Jiménez; J. Appl. Phys. 123, 114302 (2018). This paper was selected as an *editor's pick.*
4. Nanoscale effects on the thermal and mechanical properties of AlGaAs/GaAs quantum well laser diodes: influence on the catastrophic optical damage", J. Souto, J. L. Pura, J. Jiménez; Journal of Physics D: Applied Physics 50: 135201 (2017). This paper deals with the role of the low dimensionality in the catastrophic optical degradation of high power AlGaAs/GaAs laser diodes
5. Composition, optical resonances, and doping of InP/InGaP nanowires for tandem solar cells: a micro-Raman analysis; Irene Mediavilla, José L. Pura, Vanessa Hinojosa, Beatriz Galiana, Lukas Hrachowina, Magnus T. Borgström, Juan Jimenez; ACS Nano 18, 10113-10123 (2024). In this paper a microRaman study of InP/InGaP NWs with tandem cell structure was carried out revealing several resonances and plasmon modes associated with the GaP sublattice.
6. Reconstruction of Defect Creation Sequences in Diode Lasers; Martin Hempel, Jens W.Tomm, Vanesa Hortelano, Nicolas Michel, Juan Jiménez, Michel Krakowski, and ThomasElsaesser; Laser and Photonics Reviews 6, L15 (2012). In this paper in a high impact Journal (9.3) one studies by EBIC the propagation of the defects resulting from the catastrophic optical damage of a InGaAS/AlGaAs high power laser diode (broad multimode emitter)
7. Micro-Raman Spectroscopy of Si nanowires: Influence of diameter and temperature ; A.Torres, A. Martín-Martín, O. Martínez, A.C. Prieto, V. Hortelano, J. Jiménez, A. Rodríguez, J. Sangrador, T. Rodríguez; Appl. Phys. Lett 96, 011904 (2010). These paper evidenced the need of studying individual NWs in Raman spectroscopy experiments instead of bundles of NWs as it was done before. This paper was the starting point of all our posterior work on thermal transport in NWs and the interaction between light and NWs.
8. A Physical Model for the Rapid Degradation of Semiconductor Laser Diodes; A. Martín-Martín, M. Avella, M. P. Iñiguez, J. Jiménez, M. Oudart, J. Nagle; Appl. Phys. Lett. 93, 171106 (2008). Here, we presented the first thermomechanical model accounting for the catastrophic optical degradation (COD) in high power laser diodes.
9. Temperature dependence of Raman scattering of ZnO; R.Cuscó, E.Alarcón, L.Artús, J.Ibáñez, J. Jimenez, M. Callahan, B. Wang; Phys. Rev.B 75, 165202 (2007). Seminal article with more than 1700 citatations
10. Laser diode failure: crystal defects and degradation modes. J.Jiménez. Comptes Rendus de Physique 4, 663 (2003). Review requested by the editor. It deals with the description of the main degradation modes of the laser diodes.

Books

1. Defect Recognition and Image Processing in Semiconductors and Devices
Editor: J. Jiménez
Institute of Physics Conference Series No 135
Institute of Physics, Bristol 1994 ISBN 0 7503 0294 1
2. Raman and Luminescence Spectroscopy for Micoelectronics
Autores: I. De Wolf, J. Jiménez, J.P. Landesman, E. Da Silva
European community Press 1998 ISBN 92 828 5011 0

3. Microprobe characterization of semiconductors
Editor: J. Jiménez, Optoelectronic properties of semiconductors and
superlattices series, Vol 17; Taylor and Francis (New York, 2002) ISBN-13: 978-1560329411
4. Screening and packaging techniques for highly reliable quantum well high power lasers. J. Tomm and J. Jimenez, MacGraw Hill (2006) ISBN-13: 978-0071460323
5. Spectroscopic analysis of Optoelectronic Semiconductors J. Jimenez, Jens Tomm, Springer, 2016, ISBN 978-3-319-42347-0

Conferences

22 Invited talks

● Strain Driven Degradation in Laser Diodes, IEEE PHOTONICS 2011, Arlington, Virginia, 9-13 October 2011

● Material issues of the catastrophic degradation of high power laser diodes
2017 IEEE high power laser diode and systems Conference; Coventry (UK) 11-12 Octubre 2017
● Thermal and mechanical issues of high power laser diode degradation; Materials Research Society, Spring meeting 2-6 Abril 2018, Phoenix (Arizona)
● Microscopic degradation and failure processes in high-power diode lasers; 2019 IEEE high power laser diode and systems Conference Coventry (UK) 9-10 Octubre 2019

Transference

6 patents

Committees

Associate editor of Materials Letter (Elsevier) (end in 2000)
Scientific Committee member Compound semiconductor week (CSW 2014) (Montpellier, France, May 2014)
Scientific Committee member Compound semiconductor week (CSW 2015) (Santa Barbara, USA June 2015)
Member of the Steering Committee of DRIP (Defect recognition imaging and Physics of semiconductors) Conferences
Scientific Committee member ESREF 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025