

## The UPC ePowered RACING MotoStudent team participates at the 1st edition of the e-Mobility Experience Fair at the Circuit de Barcelona-Catalunya

October 29-30, 2022

The ePowered RACING team participated in the e-Mobility Experience Fair held this past weekend at the Circuit de Barcelona-Catalunya Paddock. The team, formed by students from the Escola d'Enginyeria de Barcelona Est (EEBE) of the UPC has the sponsorship of the IMB-CNM through the Power Devices and Systems (PDS) Group and D+T Microelectronica A.I.E. A delegation from the PDS group visited the team where the ePR02 prototype could be seen up close and also the opportunity to see a demonstration in operation on the Circuit the Barcelona-Catalunya track. The team is currently working on the new prototype, the ePR03, in order to participate in the 7th edition of MotoStudent scheduled for the fall of 2023.



From left to right: Emma Solà and Conrad Ferrer, researchers from the PDS group of the IMB-CNM; Núria Zhi, member of the mechanical department and Josep Francesc Aguilar, member of the electrical department of the ePowered RACING team

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### Job offers

Power Devices and Systems Group (PDS) offers **2 JAE-INTRO** scholarships for introduction to research:

- **Reference:** JAEINT22\_EX\_1532
- **Principal Investigator:** [Xavier Perpiñà Giribet](#)
- **E-mail contact:** [xavier.perpinya@imb-cnm.csic.es](mailto:xavier.perpinya@imb-cnm.csic.es)

- **Formation Plan:** Estudio de fenómenos electro térmicos locales en dispositivos semiconductores de potencia avanzados mediante deflexión interna d haz ñáser (IIRLD).
- **Reference:** JAEINT22\_EX\_1490
- **Principal Investigator:** [Miquel Vellvehi Hernández](#)
- **E-mail contact:** [miquel.vellvehi@imb-cnm.csic.es](mailto:miquel.vellvehi@imb-cnm.csic.es)
- **Formation Plan:** Optimización del depósito de capas delgadas con alta emisividad y de un sistema de Termografía Infrarroja para el análisis de dispositivos de potencia.

**Dates:** From October 5th to November 7th, 2022

**More info:** <https://jaeintro.csic.es/es/>  
<https://sede.csic.gob.es/intro2022>

## **PDS Group participation at CAS'22 Conference: Emma Solà obtains the Best Student Paper Award.**

**October, 12-14, 2022**

Emma Solà from PDS Group has participated at the 45<sup>th</sup> edition of the annual conference (CAS 2022) held in Poiana Brasov (Romania) on October 12-14, 2022 with her work entitled "Silver Sintering as Die-Attach Material for High Temperature Sensors". This paper received the CAS2022 Best Student Paper Award. Xavier Jordà also participated as an invited speaker with his work entitled "Power Systems Integration: A Key Enabling Technology for Electrification".



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## **PDS Group participation at WiPDA-Europe 2022 Conference** **September, 18-20, 2022**

Oriol Aviñó-Salvadó from PDS Group has participated at the WiPDA - Europe Conference held in Warwick (United Kingdom) on September 18-20, 2022 with his work entitled "Dopant Incomplete Ionization Role in SiC Schottky Diode Edge Termination under Current Over-Stress".

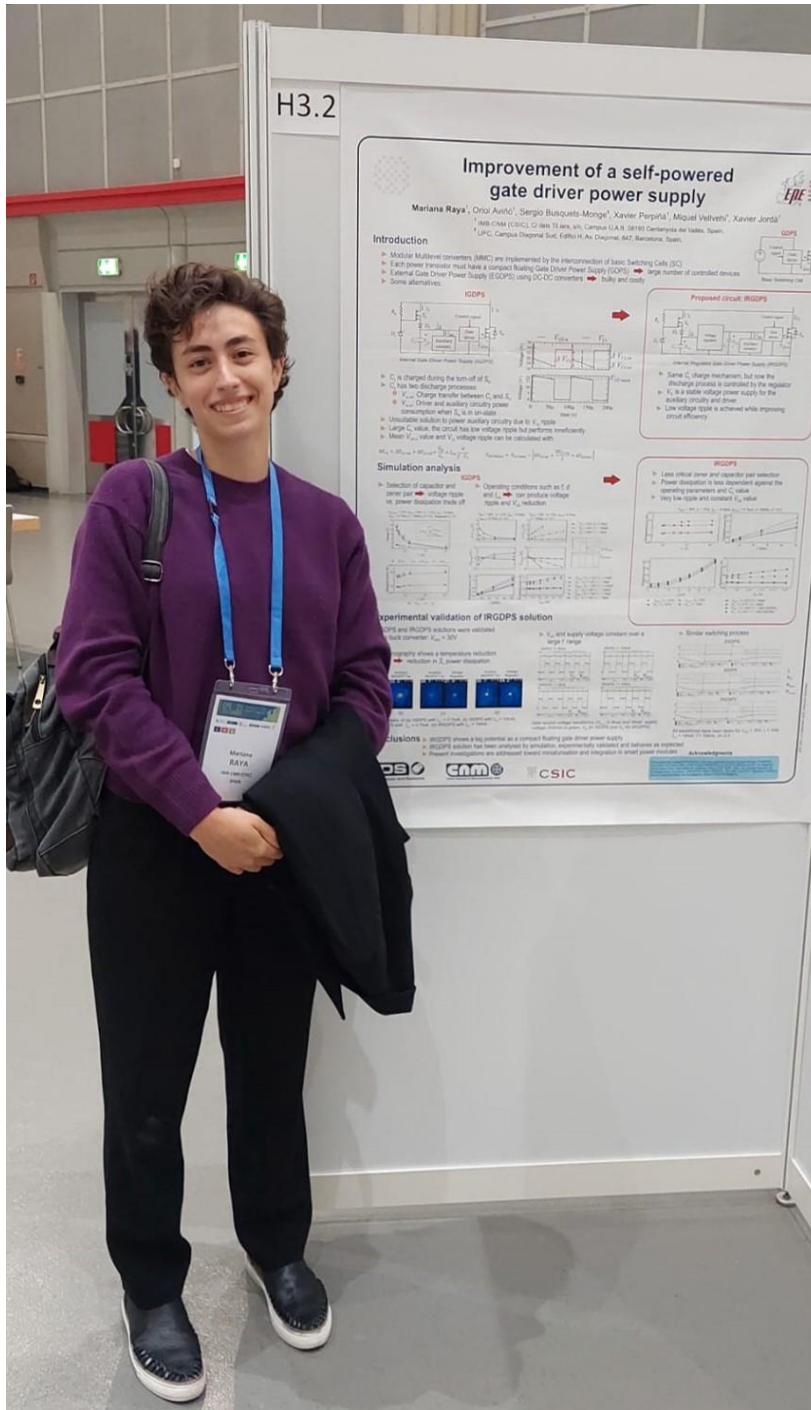


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## **PDS Group participation at EPE' 22 ECCE Europe Conference**

**September, 5-9, 2022**

Mariana Raya from PDS Group has participated at the 24th European Conference on Power Electronics and Applications (EPE-ECCE) held in Hannover (Germany) on September 5-9, 2022 with her work entitled "Improvement of a self-powered gate driver power supply".



**Jornada de Grupos de Investigación BSH**  
**September, 6, 2022**

Dr. Xavier Perpinyà from PDS Group participated at the XVII Jornada de Grupos de Investigación BSH at Campus EINA in Zaragoza. Dr. Perpinyà presented the research activities carried out during the past year about the improvement of the induction cooktop reliability at die level.



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## **PDS Group participation at IWIPP 2022 Conference** **August, 24-26, 2022**

Naüm Fusté from PDS Group has participated at the International Workshop on Integrated Power Packaging (IWIPP) held in Grenoble (France) on August 24-26, 2022 with his work on Thermo-Mechanical Constraints for Packaging of Diamond Components.



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## **Renewal of the agreement with the ePowered RACING team for the design of an electrical motorcycle** **Thursday, May 17, 2022**

The IMB-CNM renews its agreement with the ePowered RACING team, from the UPC's School of Engineering of Barcelona East (EEBE), and welcomes its members for a visit. The institute has been a sponsor of the team for years, through the Power Devices and Systems group and D+T Microelectrónica. The team consists in a group of engineering students designing and manufacturing an electric motorcycle to participate in the MotoStudent competition. Both parties have recently renewed the agreement, through which the IMB-CNM offers its support to the team and its installations for specific tasks of the group regarding microelectronic components.

It also facilitates the opportunity to develop a curricular traineeship at the with the PDS group in the IMB-CNM premises.



[Read more](#)

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## XRE4S Webminar: Energy solutions for sustainable mobility

Wednesday, April 6, 2022



On April 6th, took place the webminar "Energy solutions for sustainable mobility" organized by XRE4S, a network of research groups focused on technology transfer in the energy sector; CIAC, Cluster of the Automotive Industry of Catalonia; the CEEC, the Cluster of Efficient Energy

of Catalonia; AEPIBAL, the Business Association of Batteries, Batteries and Energy Storage; BatteryPlat, the Spanish Technology and Innovation Platform for Energy Storage; PTE-EE, the Spanish Technology Platform for Energy Efficiency; and the TransHEner project, with the aim of transferring knowledge to the productive fabric.

In this webinar, latest research advances in the field of energy to the industry and the most innovative technological solutions of the knowledge system were presented. The invited speakers present technological solutions in the field of sustainable mobility belonging to IREC, EURECAT, CNM-IMB-CSIC and the Universitat Politècnica de Catalunya, members of the XRE4S.

[Dr. Xavier Jordà](#), member of PDS Group, presented the work: Integrated power systems for sustainable electric mobility and transport.

[Read more](#)

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## **ClusterMAV: Materials from micro and nano world** **Wednesday, March 16, 2022**



Three centers from the Barcelona Nanocluster (BNC) of Bellaterra are pushing forward the state of micro/nano technologies and materials: the Institut Català de Nanociència i Nanotecnologia ([ICN2](#)), the Institut de Microelectrònica de Barcelona. Centre Nacional de Microelectrònica ([IMB-CNM](#)) and the Institut de Ciència de Materials de Barcelona ([ICMAB-CSIC](#)). The Clúster de Materials Avançats de Catalunya ([ClústerMAV](#)) is a non-profit organization that aims to boost the competitiveness of companies and entities across all the value chain of advanced materials. Activities like this one are oriented towards the creation of synergies between the members of the association and with other key members of this sector.

[Philippe Godignon](#), member of PDS Group, has participated in this event presenting the new semiconductor materials as an alternative to silicon for new-generation efficient electronics.

[Read More](#)

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## Online Pizza Seminar: How to resist extreme temperatures: a new semiconductor flying to Mercury

Friday, March 04, 2022



Invited talk by researcher at the #PizzaSeminar organized by [ICE-CSIC](#).

### How to resist extreme temperatures: a new semiconductor flying to Mercury

Electronic components based on semiconductors are widely used in scientific Spacecraft and Satellites. Silicon is the main semiconductor used for electronic devices integration, representing around 95% of the market. However, silicon exhibits several physical limitations when operating in harsh environments or extreme performances, namely at high temperature, high radiation ambient, high frequency or high voltage operation. Then, other semiconductors such as III-V or Wide Band Gap families, are considered to cover applications requiring these extreme conditions or performances. In the BepiColombo mission, defined to study Mercury, the proximity of Sun will strongly impact the Spacecraft electronics, especially the solar panels. We have used an innovative WBG semiconductor, Silicon Carbide, to develop a solar panel protection components able to operate in the extreme temperature and radiation environments of the mission. The device has been developed from scratch, as no equivalent device was available worldwide. A qualification test campaign has been defined and performed, adapting the ESA test standards to the unprecedented specificities of the BepiColombo mission. Finally, flight parts have been produced and delivered to the Solar Panel manufacturer for their integration. This is the first Wide Band Gap semiconductor active device used in a Space mission.

[Follow the session](#)

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### The CSIC INVESTIGA magazine collects the IMB-CNM's research in energy on storage and electrification

Wednesday, Decembre 8th, 2021

The latest issue of the CSIC INVESTIGA magazine focuses on Energy and collects research from the organization's groups and institutes devoted to its study. The IMB-CNM is mentioned on several occasions for its work on self-powered low-consumption sensors, for the research for materials that replace silicon or for the investigation into



the reliability of electronic components. The Clean Room, a large facility where semiconductors for energy applications can be manufactured, also stands out. CSIC INVESTIGA is a publication coordinated by the CSIC Communications team and is published twice a year. Each issue deals with one of the great challenges of today's society and collects the efforts of the CSIC centers and units in the matter. Towards clean, safe and efficient energy.

This report focuses on power electronics and the research carried out by the PDS group, Power Devices and Systems, which has been exploring semiconductors for more than 30 years and is the only CSIC team devoted to the field. This branch of electronics uses materials such as silicon (Si) and more efficient derivatives to contribute to the replacement of fossil fuels. Power electronics is at the heart of wind turbines, electric cars or photovoltaic panels and is essential to take advantage of renewable energy generation. The IMB-CNM participates in a European project, iRel40, to improve the reliability and useful life of electronic components. The team investigates failure detection and degradation indicator parameters through artificial intelligence. The improvement of the predictive maintenance of the system through self-correction helps to considerably extend its life time. The short useful life of some electronic components is one of the most widespread problems in the industry, forcing their replacement and generating waste. Works in this line help to extend its life without changing the materials or the manufacturing process.

[Read more...](#)



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## **GreenDiamond project receives the trophy "Les Étoiles de l'Europe"** *Wednesday, Decembre 8th, 2021*

GreenDiamond, a Horizon 2020 project, received in Paris the trophy "Les Étoiles de l'Europe", as a reward to "the European commitment of teams of researchers who have distinguished themselves by the success of their projects, to highlight their work and to encourage -by their example- their colleagues to respond to the ever-increasing number of calls for proposals from the European framework program".

GreenDiamond was a project aimed at fabricating the first high power electronic device with diamond that is competitive with incumbent wide-band-gap semiconductor materials and technologies, opening new commercial and industrial opportunities.

Diamond is a promising material to replace silicon in semiconductor technologies. The IMB-CNM was leader of the WP7, with Philippe Godignon from PDS Group acting as PI. In the photograph, the one in the right.



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## **The IMB-CNM supports the UPC ePowered RACING team**

*Tuesday, July 8th, 2021*

The IMB-CNM acts as a sponsor of the ePowered RACING team of the UPC's School of Engineering of Barcelona East (EEBE), through the Power Devices and Systems group and D+T Microelectrónica. The EEBE team is a group of engineering students dedicated to the design and manufacture of an electric motorcycle to participate in the MotoStudent competition. Both parties signed a collaboration agreement at the end of July 2020, where the PDS group undertakes to give its support to the team and to facilitate the reception of students from the same to develop their curricular practices at the IMB-CNM. The PDS group is specialized in power semiconductor devices, a key element for the development of electronic circuits that allow the control of electrical energy, as for example in the traction converters of an electric motorcycle. This collaboration has consisted of advising on the electrical and thermal design of the power circuit and facilitating access to specific electronic material for all the motorcycle's circuitry boards.

ePowered Racing is specialized in the manufacture of electric racing motorcycles. The ePR02 motorcycle is the result of the last year of work to race in the MotoStudent competition. The VI MotoStudent International Competition will be held between July 15 and 18 at the TechnoPark MotorLand circuit in Alcañiz (Teruel) with more than 40 teams participating from around the world. MotoStudent (Moto Engineering Foundation and TechnoPark MotorLand) is an international competition for university teams to test the knowledge acquired during the race in an industrial project.



More info:

<https://epoweredracing.eebe.upc.edu/inici.html>

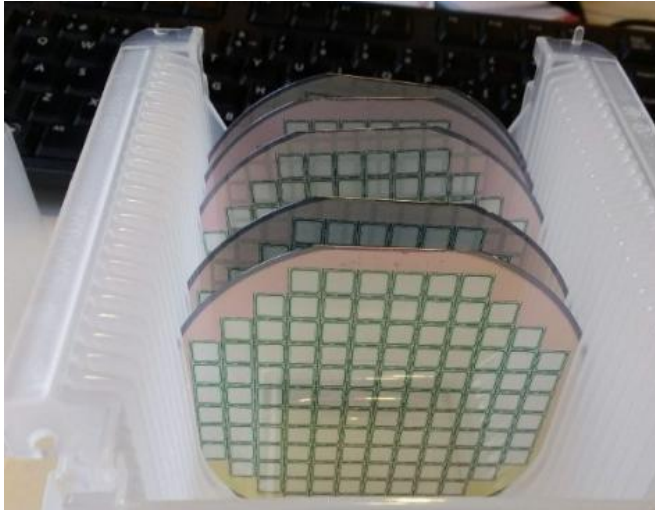
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## **New portable device for automated radon detection**

***Thursday, June 22nd, 2021***

A member of Power Devices and Systems Group, Salvador Hidalgo, in collaboration with the Radiation Detectors Group has developed at IMB-CNM's Clean Room a device, which features a silicon sensor that monitors radon levels automatically and remotely. Radon gas is the largest source of natural radiation exposure in humans and causes 3-14% of lung cancer cases. The biggest challenge has been the integration of silicon in the heart of the radon detector; the final characteristics of the system depend on its quality, stability and repeatability. Modular structures consisting of ten silicon detectors have been fabricated, three of which have been used for this prototype, positioned in a novel way. This solution allows us to have a very flexible system, with quick and easy adaptation depending on the application.

The prototype, still in the standardization phase, is the result of the CARE project, an initiative that has been led by the company Alibava Systems and has had the participation of two public research centers, the IMB-CNM-CSIC and the Instituto Galego de Física de Altas Enerxías (IGFAE) of the Universidade de Santiago de Compostela, which has been responsible for carrying out the calibration and validation tests, both in its experimental facilities and in real environments. CARE also involves three companies, ATI Sistemas SL, Radiansa Consulting SL, Sensing & Control Systems SL



[Read more](#)  
[Link to Muy Interesante magazine \(Spanish\)](#)

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**XRE4S - R+D+I Network Energy for Society - Interview to Dr. Xavier Jordà,  
Head of Power Devices and System Group**  
*Friday, May 21st, 2021*

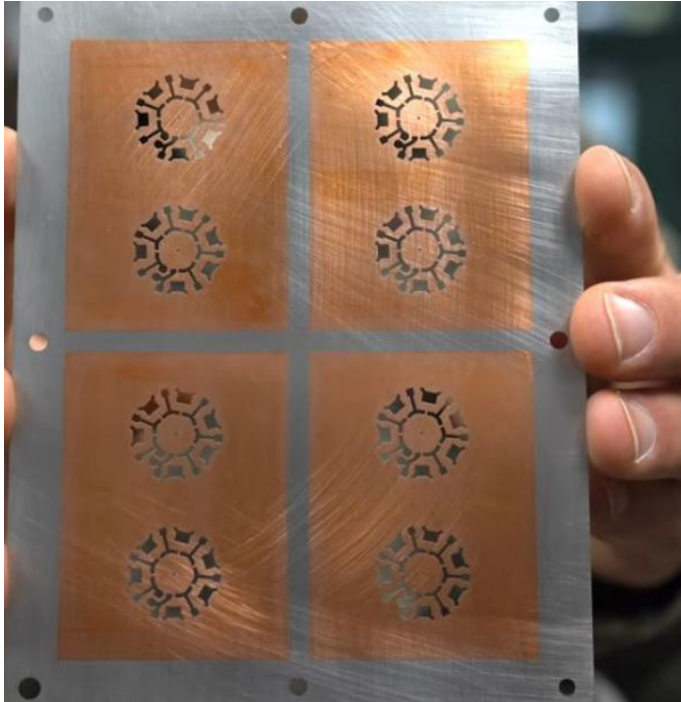


## **XRE4S - R+D+I Network Energy for Society - Selective deposition of thin films on microdevices**

The Power Devices and Systems group at IMB-CNM has developed a shadow-masking method based on a set of self-aligned metallic masks that allows the selective metallization of microelectronic substrates and devices for the implementation of tracks and pads. It is based on a set of masks that do not need photolithographic process or complex alignments.

Find more details in the XRE4S technology portfolio at <https://xre4s.cat/portfolio/>





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## Job offers

Power Devices and Systems Group (PDS) offers **4 JAE-INTRO** scholarships for introduction to research:

- **Reference:** JAEINT21\_EX\_0937
- **Principal Investigator:** [Francesc Xavier Jordà Sanuy](#)
- **E-mail contact:** [xavier.jorda@imb-cnm.csic.es](mailto:xavier.jorda@imb-cnm.csic.es)
- **Formation Plan:** Diseño y caracterización de celdas de conmutación de alta densidad de potencia.
  
- **Reference:** JAEINT21\_EX\_0622
- **Principal Investigator:** [Xavier Perpiñà Giribet](#)
- **E-mail contact:** [xavier.perpinya@imb-cnm.csic.es](mailto:xavier.perpinya@imb-cnm.csic.es)
- **Formation Plan:** Estudio de fenómenos electrotérmicos locales en dispositivos semiconductores de potencia avanzados mediante termoreflectancia y electroluminiscencia.
  
- **Reference:** JAEINT21\_EX\_0622
- **Principal Investigator:** [Miquel Vellvehi Hernández](#)
- **E-mail contact:** [miquel.vellvehi@imb-cnm.csic.es](mailto:miquel.vellvehi@imb-cnm.csic.es)
- **Formation Plan:** Optimización del depósito de capas delgadas con alta emisividad y de un sistema de Termografía Infrarroja para el análisis de dispositivos de potencia.
  
- **Reference:** JAEINT21\_EX\_0616
- **Principal Investigator:** [Gemma Rius Suñé](#)
- **E-mail contact:** [gemma.rius@imb-cnm.csic.es](mailto:gemma.rius@imb-cnm.csic.es)

- **Formation Plan:** Materiales y técnicas de Sensado mediante Micro/Nanofabricación, para la Exploración y Colonización Humana en el Espacio.

**Dates:** From March 10 (0:01h) to April 12 (23:59h)

**More info:** <https://jaeintro.csic.es/es/>  
<https://sede.csic.gob.es/intro2021>

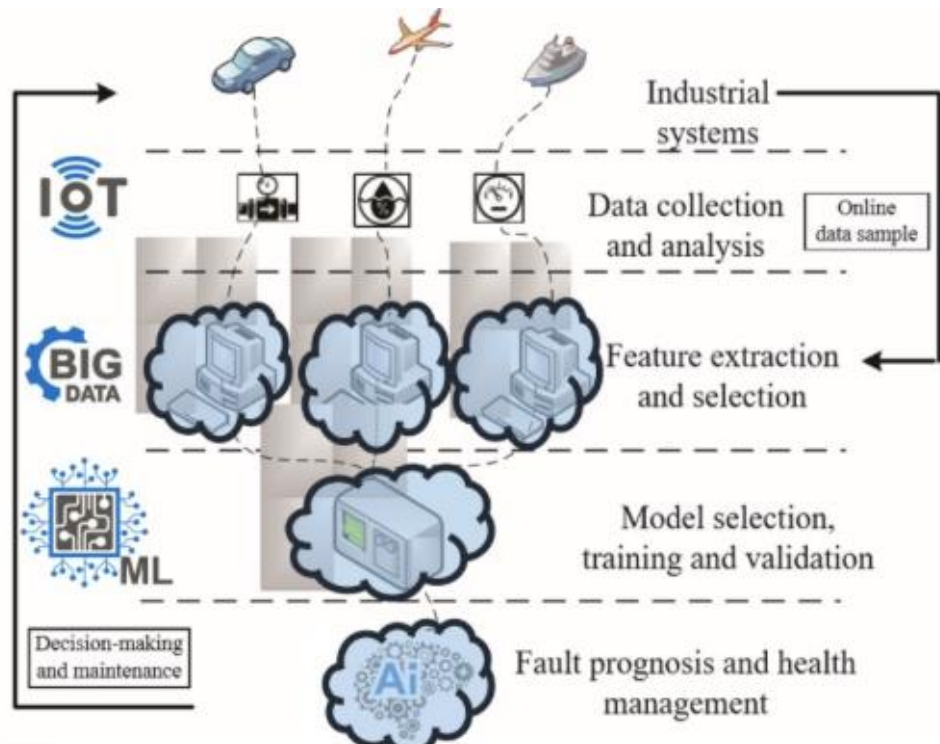
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## **IMB-CNM collaborates in a project with 75 institutions from over 13 countries to improve reliability for electronic components**

***Friday, February 19th, 2021***

Intelligent Reliability 4.0 (iRel40) is an international project to enhance the ECS reliability, a “must have” to fulfil customer demands and the needs of an increasingly more complex environment. Current electronic components and systems (ECS) are becoming more compact and complex every day, thus making more difficult to face the reliability analysis in them. Now, it is required to follow a holistic approach through the entire value chain of an ECS product, such as the material, chip, packaging and system. Typical function structure for data-driven PHM approach based on IoT systems, BDA and ML strategies. Intelligent Reliability 4.0 (iRel40) is an international project to enhance the ECS reliability, a “must have” to fulfil customer demands and the needs of an increasingly more complex environment, as the world transitions to complex systems with more electronics and autonomy in various application domains. It is happening with the new smart transport and mobility, the digital industries, the industrial production or the energy sector. In this framework and during 3 years, iRel40 connects 75 institutions from 13 European countries, including the Institute of Microelectronics of Barcelona through the Power Devices and Systems Group.





[Read more](#)

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**IMB-CNM becomes a member of the FutuRed Platform. The PDS Group participates in the presentation of the power electronics prospective document.**

*Friday, October 31st, 2020*

FutuRed is a Spanish Technological Platform of Electrical Grids created for integrating all the agents involved in the electricity sector, to define and promote strategies at national level allowing the consolidation of a more advanced network capable of responding to future challenges. The IMB-CNM has recently become a member of FutuRed through its PDS research group.

<https://www.futured.es/en/>

The PDS Group participated on October 28 in a webinar to present the power electronics prospective document prepared by the FutuRed platform. Power electronics is called to play a fundamental role in the energy transition, and the document addresses the main strengths and challenges regarding this technology from a national perspective.

<https://www.futured.es/en/power-electronic-workgroup/>



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## **Collaboration agreement between the PDS Group of the IMB-CNM and the ePowered RACING of the EEBE-UPC**

*Thursday, September 3rd, 2020*

At the end of July, a collaboration agreement was signed between the Power Devices and Systems Group (PDS) of the Barcelona Institute of Microelectronics - National Center for Microelectronics (IMB-CNM), and the ePowered RACING team from the Barcelona East School of Engineering (EEBE) at the UPC. The agreement has been conveyed through the association of economic interest (A.I.E.) D + T Microelectronics, responsible for the commercial management of the Clean Room of the IMB-CNM. EEBE's Powered RACING is a team of young engineering students that aims to design and manufacture a 100% electric motorcycle to participate in the MotoStudent competition. The PDS group of the IMB-CNM has been carrying out its research work for more than 30 years on power semiconductor devices, the key element needed to develop electronic circuits that allow the control of electrical energy (known as converters) used in a wide range of applications: electric traction, battery chargers, industrial actuators, induction cookers, etc. With this collaboration agreement, the PDS group will support the members of ePowered RACING as well as provide them the possibility of developing their curricular practices in a research environment related to power electronics.

Related web-sites:

PDS Group: <http://power.imb-cnm.csic.es/>

IMB-CNM(CSIC): <http://www.imb-cnm.csic.es/index.php/en/>

ePowered RACING: <https://epoweredracing.eebe.upc.edu/inici.html>

D+T Microelectrónica: <http://www.dtm.es/>



*From left to right, Pau Guàrdia (co-leader of the electronics department of ePowered RACING), Alquema Mohammad (member of this department) and Xavier Jordà (leader of the PDS Group) at the IMB-CNM during the signing of the collaboration agreement.*

## **BepiColombo takes last snaps of Earth en route to Mercury**

**Friday, April 10th, 2020**

The ESA/JAXA BepiColombo mission completed its first flyby on 10 April, as the spacecraft came less than 12 700 km from Earth's surface at 06:25 CEST, steering its trajectory towards the final destination, Mercury. Images gathered just before closest approach portray our planet shining through darkness, during one of humankind's most challenging times in recent history. In this mission, there are 700 protection diodes for the photovoltaic cells of the solar panels designed and fabricated at IMB-CNM facilities.



[Read more](#)

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## **IMB-CNM Talks: Overview of research activities @ G2ELab (Power Electronics) by Prof. Jean- Christophe Crebier**

*Wednesday, February 19th, 2020*

## IMB-CNM Talks

Invited Session

### Overview of research activities @ G2ELab (Power Electronics)



Jean-Christophe Crebier

G2ELab is located in Grenoble, France and is focused on Electrical Engineering related research activities. After a brief general presentation of the teams and main research topics of the lab, the talk will focus on what has been done and what is currently done in the Power Electronics Group. Perspectives will also be introduced.

- Focus on Epicub project and how to transpose the microelectronics digital synthesis concept in the field of power electronics will end the first part of the talk.

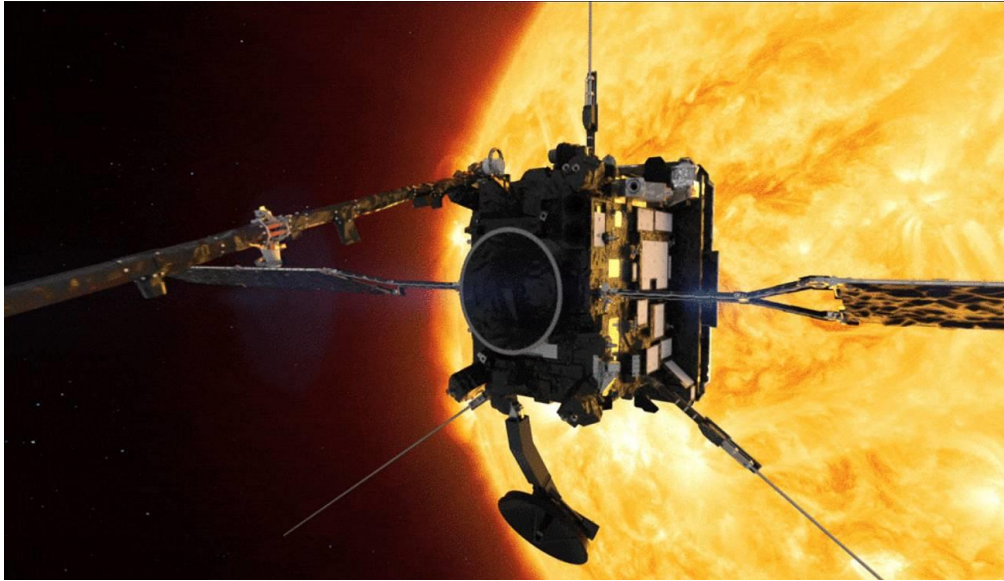


 Sala d'Actes "Pepe Millán" (IMB-CNM)  
 Wednesday 19-02-2020 | 11:30h

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## Silicon Carbide components of the IMB-CNM, go back into space

The Instituto de Microelectrónica de Barcelona - Centro Nacional de Microelectrónica (IMB-CNM) that belongs to Consejo Superior de Investigaciones Científicas (CSIC), has developed and fabricated one of the electronic components of Silicon Carbide for the joint space mission of NASA and the ESA, Solar Orbiter. These devices are protection diodes of the photovoltaic cells of the solar panels, and they are essential to guarantee the energy supply in the ship. Located next to the solar panels to protect them in case of failure of one of the cells, they are prepared to withstand extremely high temperatures.



The ship will be exposed to temperatures of more than 400 °C. However, the solar panels are inclined so that the exposure is not so direct and will "only" receive up to a maximum of 350 °C. These components use the same technology that scientists, members of the IMB-CNM Group of Power Devices and Systems, had already developed for an earlier mission, the BepiColombo. This time, scientists have adapted some parameter in the design to meet the environmental conditions of this new mission.

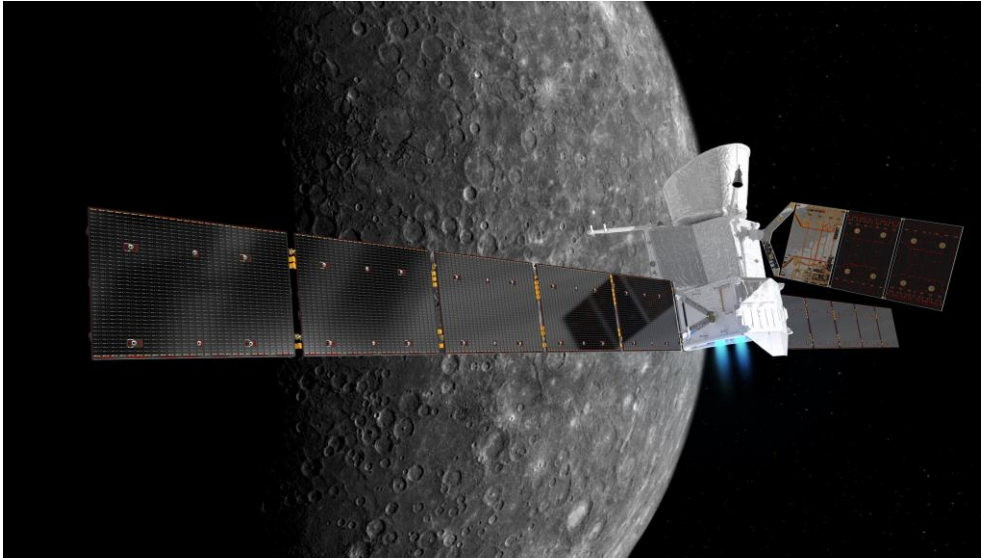
The ship was launched on February 10, 2020 at 4:03 UTC aboard a NASA Atlas V rocket from Cape Canaveral Air Force Station in Florida, United States.

[Read more](#)

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## Components designed and manufactured at IMB-CNM will travel to Mercury

Electronic components designed and manufactured at the Barcelona Institute of Microelectronics (IMB-CNM) travel to Mercury in the BepiColombo mission, whose launch, on board the Ariane-V, is scheduled for next Saturday, October 20, from Kourou (Guyana French). As reported by the Consejo Superior de Investigaciones Científicas, of which the IMB-CNM is a part, there are 700 protection diodes for the photovoltaic cells of the solar panels of the two probes that this joint mission of the European Space Agency (ESA) and The Japanese Space Agency (JAXA) will leave Mercury in orbit in 7 years to explore that planet.



These 700 protection diodes will be exposed to very extreme temperatures, from 300 ° C during 'day' to 150 ° C below zero at 'night', and are located next to the solar panels to protect them in the event of a cell failure. In order for the devices to withstand these extreme conditions, the team led by Professor Philippe Godignon has developed the diodes with Silicon Carbide (SiC), a new semiconductor that is replacing silicon in many applications of power electronics such as, for example , the electric car. ALTER Technology from Madrid has also participated in this project, carrying out tests and qualification for the diode space.





[Read more](#)

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## **IMB-CNM Talks: Reliability testing methodology and lifetime modelling by Prof. Zoubir Khatir**

*Tuesday, October 16th, 2018*

## IMB-CNM Talks


### Reliability testing methodology and lifetime modelling

#### Prof. Zoubir Khatir

**Abstract:** Lifetime reliability testing of power electronic devices by using power cycling tests is required to build up lifetime models. With them, the power devices remaining useful lifetime can be assessed to practice predictive maintenance. In this sense, recent experimental works carried out at IFSTTAR will be presented, such as reliability testing methodologies, aging strategies, methods for failure mechanisms separation, and cumulative degradation assessment. Some specific results on WBG devices (GaN HEMTs) will be described. Finally, modeling aspects will be discussed, like building lifetime models based on electro-thermo-mechanical stresses and material degradations.

**Speaker Details & Scientific Scope:** Prof Z. Khatir (7th August, 1960) is a researcher at IFSTTAR, SATIE Laboratory (Versailles, France), leading the TEMA (Technologies pour une Electro-Mobilité Avancée) research group. His current research interests include the reliability in high-temperature environments of silicon and wide band gap power devices in the field of transport applications. In the power devices reliability field, he has authored more than 60 scientific publications on international referenced journals, 110 communications in international conferences (10 invited), and supervised 22 PhD thesis. He is currently involved on several scientific committees in international conferences on power devices reliability, and is a project expert for the French Research Agency (ANR) and the EU (H2020).

16/10/2018 @12.0  
Sala de Actos Pepe Millán, IMB-CNM



## Premi Extraordinari de Doctorat




### Premi extraordinari de doctorat

Atorgat a Javier León Cerro  
per la tesi titulada:

*Advanced analysis of microelectronic devices and systems by lock-in IR thermography*





Bellaterra, 18 de Maig de 2018