

**Postdoctoral Fellowship under the Marie S. Curie Actions Cofund project “Opening Sphere UAB-CEI to Postdoctoral Fellows (P-Sphere)” Gran Agreement 665919.**

**Department or Institution involved**



**Development and Characterization of Advanced Power Packaging Techniques**

**Topic description**

The objective of the project that will host the fellow aims at providing new and advanced solutions for packaging semiconductor power devices. Nowadays, the development of wide band-gap semiconductors provides advanced power devices with high-speed switching capabilities, high-temperature capability, high-voltage ratings and, in general, high-power densities. These capabilities are usually limited by the package (the “interface” between the die and the electronic circuit) and not by the device itself. For this reason, new assembly techniques, materials, topologies, etc. are of main interest for reaching the maximum operation performances provided by wide band-gap semiconductors.

The Fellow will implement his work mainly on the following areas:

- packaging solutions allowing high-speed switching (interconnections) and high-temperature capability (materials)
- thermal management (cooling strategies and thermal characterization)
- electrical and thermo-mechanical reliability.

**Project supervisor & hosting group**

Dr. Xavier Jordà will supervise the Fellow. He is full time senior researcher at IMB-CNM-CSIC in Barcelona, Head of the Power Devices and Systems group. This group started its research activities 30 years ago on the development of semiconductor power devices (VDMOS, IGBT, etc.). On 2000 the group extended its activities towards the Power Systems Integration and Reliability (PSIR) field, in particular working on the development of advanced electro-thermal characterization techniques, on new packaging solutions suitable for high-power and high-temperature power devices, and on the study of their failure and reliability mechanisms. This research line has participated in more than 10 Spanish projects, 5 EU projects and more than 10 industrial contracts, and their researchers have published more than 50 papers. The Power Devices and Systems Group involves 22 people while the PSIR team consists of 3 senior researchers, 3 PhD students and a support engineer. The group mainly works on the following research areas:

- Silicon Power Devices
- Wide Band Gap Semiconductor Devices
- Power Systems Integration & Reliability

The projects under development related with the proposed subject include two EU funded projects, one from the ECSEL JU (PowerBase) and a second one from the H2020 LCE call (GreenDiamond), and a Spanish national project (SmartCells). These projects cover the characterization and modelling of wide band-gap power semiconductor devices (GaN, diamond, SiC), the development of packaging techniques suitable for high-temperature and high-speed switching and the integration of control and monitoring circuitry with the power devices in the same package (intelligent power modules).

### **Planned Secondments**

No secondments are initially foreseen. In any case, the Fellow will receive support to participate actively in any meetings with partners of any related ongoing project. He/she will receive specific training in micronanofabrication and electronic device and systems characterisation as needed to acquire or consolidate scientific and technological background, and his/her participation is expected in appropriate workshops and conferences.

### **Candidate's profile**

To be regarded as an eligible applicant, the candidate should have:

- PhD in Electronic or Mechanical Engineering or Physics;
- Knowledge and experience in most of the following:
- Packaging of Semiconductor devices.
- Power Systems
- Electrical and Thermal characterisation of devices.
- Proficiency in both written and spoken English is necessary.

### **Research contact:**

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