The **Power Electronics and Integration research team** within the **Ampère laboratory** (Lyon, France) is offering several positions for students willing to pursue a

PHD in the field of Power electronics.

Silicon Carbide (SiC) components:

Three positions available:

- **Characterisation and Modeling of SiC-based MOSFET Devices for Power Conversion**. The objective is to obtain a good knowledge of these devices, including temperature effects.
- **Design, Supervision, and Characterisation of SiC-Based High Voltage Devices**. This subject involves the design of some unipolar and bipolar devices with a breakdown voltage above 5kV, using FEM simulators, the supervision of the manufacturing process (in collaboration with other research centres) and the characterisation of the resulting devices.
- **Optimisation of lateral structures in SiC for power devices integration and high temperature applications**. This work will be based on several ongoing projects about SiC integration, to be able to build SiC-based power Integrated Circuits (ICs).

Diamond Components:

Design, Realisation and Characterisation of Diamond-Based Power Devices. While our research group has been working on silicon carbide for years, we are fairly new to the world of diamond. The objectives of this subject is to design, manufacture and characterise some simple power devices to evaluate the potential of this material. The devices will be made by the candidate using the equipment of our partner (LAAS) in Toulouse.

Passive Components:

Design, Realisation and Characterisation of High-Frequency, Integrated Inductors. This work is aimed at building an integrated power converter (0,1 to a few watts) that fits in an IC package (System In Package, SIP). This converter is supposed to operate at several megahertz, so many parameters have to be taken into account for a proper design of the inductor.

SOI Components

Building Blocks for a SOI-Based, High-Temperature Driver. With the commercial availability of SiC-based power switches, high temperature converters become possible. However, most of the drivers ICs have a relatively low maximum operating temperature. Furthermore, the SiC devices (mainly JFETs) have requirements that are quite different from Si MOSFETs or IGBTs. Therefore, we want to design and build a driver adapted to the SiC JFETs and operating over an extended temperature range, using the Silicon-On-Insulator (SOI) technology.

High Temperature Packaging

Another stumbling block for high temperature power electronics is the packaging of the power modules: most of the current technologies are either no reliable, not available, or too expensive. We propose two positions to work on **new packaging technologies for aerospace applications**, one in Lyon, the other in Tarbes (near Toulouse).

We're looking for candidates with a solid background in materials, semiconductor physics, microelectronics or devices technologies.

The positions are remunerated, depending on candidate experience, and publication, as well as participation to international conferences is encouraged.

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