

## PhD Offer / Proposal at IMB-CNM (CSIC)

### PhD Thesis Tentative Title

***Environmental impact evaluation and optimization of SiC power semiconductor processing***

### PhD Topic Brief Description

This technological research deals with developing more energy efficient and reduced contaminant processing steps of Silicon Carbide for electronic devices fabrication. Silicon Carbide (SiC) is a novel semiconductor material used for electronics which is currently under exponential development. SiC is used for power devices integration in electric cars, renewable energy management and smartgrids, as well as for Space and high energy physics applications. Currently, the fabrication of SiC devices requires more energy consuming and more contaminant processing steps than its Silicon equivalent. Novel approaches are required to be found and tested to reduce these process steps economical and environmental impact.

We have been recently granted with a European Project where our task will be to work on the theoretical and experimental study of novel SiC processing steps. This project is carried out in collaboration with German, Swiss, French, Swedish and UK academic and industrial partners. According to this, a three years PhD work is offered, aiming at analysing the following main issues:

- i) Analysis of the full fabrication process of a power SiC MOSFET from the point of view of the materials, consumables and energy consumed
- ii) Optimisation of the semiconductor doping procedures using innovative processes: channelled implantation, minimum temperature activation annealing, surface diffusion, ...
- iii) Optimization of the thermal budget for dielectrics formation: gate dielectric, field oxide, ...
- iv) Elimination of SF<sub>6</sub> and CF<sub>4</sub> gases in the SiC dry etching process.
- v) Optimization of the devices architectures based not on electrical performances but on fabrication impact.

The tasks will combine numerical simulations, clean room processing and structural (SEM, AFM) and electrical characterizations

### Duration

36 months.

### Candidate Profile

M. Sc. in Electronics Engineering, Materials Science or Chemical Engineering.

### Contact Persons

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