The **French-German Research Institute of Saint-Louis (ISL)** situated in the border triangle of Germany, France and Switzerland is an internationally renowned research institute belonging to a global industrial and economic network.
The spectrum of our core activities comprises a variety of topics: aerodynamics, energetic and advanced materials, lasers and electromagnetic technologies, protection, security and situational awareness. Our activities are related to both basic and applied research.

ISL is offering a **PhD Position**

Research field: Laser and electromagnetic technologies

Investigation and basic development of amplifying gate structures for SiC thyristors

Power electronics is regarded as a key technology to meet the steadily growing demand of the market, especially when it comes to higher efficiency and reliability in managing the electric energy resources for both power supply networks and autonomous mobile platforms. Owing to its outstanding physical properties, silicon carbide (SiC) by far surpasses the performance of conventional silicon (Si) power technology and makes it the prime candidate for next-generation high-voltage switching devices. In large-area, Si-based power switches such as phase control and light triggered thyristors, amplifying gate structures have been state-of-the-art for several decades and virtually represent an industry standard today.

In this context, research has been launched to demonstrate the feasibility and basic potential of amplifying gate structures for thyristors based on SiC. The goal of this PhD study is to fully exploit the characteristics of integrated gate structures on thyristor switching, from simulation and design to device fabrication and finally technical evaluation. Thus, it aims to form the backbone of a technology platform targeted for the development of future high-voltage (> 10 kV) SiC thyristor devices.

The PhD candidate is expected to show strong commitment and dedication in his/her contribution to ISL's efforts in realizing SiC thyristors as his/her work will form an integral part of its innovative research activities in pulsed power device technology.

At a glance, this work includes

- Implementation of novel gate architectures for large-area thyristor devices
- Optimization of thyristor anode short geometries
- Process development critical to wafer processing, die bonding and packaging
- Evaluation of device performance (static, dynamic, pulse, lifecycle)
- Characterization of intrinsic material parameters (carrier lifetime, Hall mobility, etc.).

As the gate-anode design is critical to gate triggering current rating and thyristor turn-on uniformity, its configuration needs to be thoroughly revamped and optimised. The proof-of-concept SiC device will then rely on a conventional p-n-p-n epilayer structure with a tailored amplifying gate design enabling a high yield.

French-German Research Institute of Saint-Louis (ISL)

Ralf HASSDORF – Pulsed power technologies
5 rue du Général Cassagnou – 68301 Saint-Louis – France
ralf.hassdorf@isl.eu – tel : +33 (0)3 89 69 53 74

www.isl.eu