Cité Descartes
2 boulevard Blaise Pascal - BP99 – 93162 Noisy-le-Grand
Tél. 01 45 92 65 00 – Fax 01 45 92 66 99
www.esiee.fr

Postdoctoral Position
in
Thermal Management and Advanced Cooling Strategies for Future Radio Communication Components and Devices

Context and project

The present project takes place in the framework of IPCEI (Important Project of Common European Interest) programme on nanoelectronics implemented in France as Nano2022 programme, supporting mico and nano-electronic industries. It is a collaboration between ESIEE Paris school of Engineering and X-FAB Silicon Foundries.

Created in 1904 under the name of Ecole Breguet, ESIEE Paris has immediately distinguished itself as an engineering school focused on innovation and entrepreneurship. ESIEE Paris is a school of the Chamber of Commerce of Paris. Research, innovation, and industrial collaborations are therefore a priority for ESIEE Paris, mainly focused on 3 areas: ICT, Health and Sustainable Cities and Societies. ESIEE Paris is also a founding member of University Paris East and holds several joint laboratories with CNRS, University Paris East Marne La Vallée (UPEM) and other academic partners. The post-doctoral candidate will joint ESYCOM (Electronique, SYstèmes et COMmunication) Laboratory, one of ESIEE Paris major laboratories.

ESYCOM Lab gathers 35 scientists/engineers and 35 Phd students and post-doctoral fellows carrying research on "Sensors and communicating devices for city, environment and persons monitoring". It includes 2 groups : "Micro-Sensors and nanomaterials" group works on sensors and micro-systems for the analysis of complex environments, micro sensors and interfaces for biology and MEMS devices for energy harvesting. On the other hand, "RF, mm and optical systems" group, develops research on electromagnetic design and modeling of HF and UHF RFID tags in complex media and harsh environments, electromagnetic energy harvesting and wireless architectures for high data rates.

The industrial partner of the project, X-FAB Silicon Foundries, is a group of semiconductor foundries, with headquarters in Erfurt (Germany). It specializes in the fabrication of analog and mixed-signal integrated circuits for fabless semiconductor companies, as well as MEMS and solutions for high voltage applications. X-FAB has six plants, one of which is located in France (Paris Region, Corbeil-Essonnes).

X-FAB develops cutting edge components and devices for 5G NR new radio access technologies which enable high data rates and cover large frequency bands. Such interesting performances require increasing operating power which induces stronger thermal constraints. Efficient thermal management of those devices is therefore a key parameter for enhanced components reliability and life time. Enhancing thermal management of existing devices and providing new strategies for the same, while improving design tools to account more accurately for thermal constraints is the main goal of the present project.

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Major responsibilities

Your main goal is to investigate how the performance of III-nitride (GaN for example) components and devices are limited by self-heating and how they can be improved by passive cooling strategies. This includes electro-thermal characterization of materials and devices under realistic operating conditions using thermal conductivity measurement (3-omega technique, DC measurements) and thermography techniques. Different materials currently used or considered as good candidates for such devices will be characterized. Different configurations with single and multiple heat sources (transistors) will be considered. Experimental results will be compared to electro-thermal numerical simulations. After characterization of existing materials and devices, developed numerical models will be used to explore advanced passive cooling strategies to reduce Joule self-heating. You will provide designs for numerically optimized architectures that will be fabricated in X-FAB factories before characterization in ESIEE Paris and ESYCOM experimental platforms. Your work therefore covers, modeling and numerical simulations as well as circuits design and experimental characterization. Good oral and written communication skills are expected for internal and external reporting tasks, internal seminars, national and international conferences as well as journal publications.

Position summary

Full-time temporary researcher position. The position is a 13-month contract as a post-doc.

Qualifications

A PhD degree or a previous post-doc in microwave electronics, semiconductor physics, heat transfer or component and devices cooling,

Expected skills and fields of expertize

Skills :

- Previous hands-on laboratory experience is mandatory (in thermal and electro-thermal characterization methods would be a plus),
- Previous experience with multi-physical simulations, including electro-thermal simulation,
- Business level English proficiency is mandatory,
- Ability to work well in a team/support environment is required,
- The candidate should have familiarity and some practical use of design tools. Cadence is preferred,
- Familiarity with Si microelectronics is desirable,
- Competency in emerging technology areas that are important to Company is a plus.

Fields of expertise:

Heat transfer, thermal and electro-thermal characterization methods, Multi-physics numerical simulations (mainly electro-thermal), Thermal management of electronic systems and related topics.

Our offer to you

ESIEE Paris and University Gustave Eiffel offer a cultivating and inspiring working environment at 20 minutes from the center of Paris, one of the most attractive capital cities worldwide. We also offer an attractive salary, health insurance, and partially cover transportation and catering fees.

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Application procedure

The application should be written in French or English and sent electronically as a single PDF file containing the following documents:

CV including but not limited to:

- Complete list of publications,
- Previous teaching and pedagogical experiences,
- Two references that we can contact.

Cover letter, 1-2 pages where you describe :

- Yourself and present your qualifications,
- Previous research fields and main research results,
- Future goals and research focus. Are there any specific projects and research issues you are primarily interested in?

Application deadline: 31/12/2020

Starting date: 01/12/2020

For questions, please contact:

Associate Professor Elyes NEFZAOUI, elyes.nefzaoui@esiee.fr, +33145926756