



Title of the PhD offer:

Integration of graphene on micro-acoustic radiofrequency devices

Keywords : electronic transport measurements, radiofrequency, acoustic waves, microtechnologies, graphene, transfer

Description of Laboratory/University :

Ecole Nationale Supérieure de Mécanique et des Microtechniques (ENSMM, <https://www.ens2m.fr/>) is an national engineering school located in region Franche-Comté, France. **FEMTO-ST institute** (www.femto-st.fr) is a multidisciplinary research institute made up of seven departments covering numerous domains of engineering sciences and including more than 500 scientific, administrative and technical support staff. About 225 PhD students receive a high-level training in scientific research. It is one of the most competitive research institutes in France and is among the leaders in the world on Engineering for micro and nanoscale. The institute is a major actor of the industrial pole "Microtechnics" in the Franche-Comté region. One of the key research topics at FEMTO-ST Institute is the development of devices based on electro-active materials with particular emphasis on microelectromechanical systems (MEMS), photonics, electro-optics, phononics, acoustics, and robotics. FEMTO-ST institute has a microfabrication technology center with clean room facilities MIMENTO mixing technologies from microelectronics to micromechanics. MIMENTO (<https://www.femto-st.fr/en/Platforms/MIMENTO-Presentation>) is a member of the national network of seven largest clean rooms in France (RTB).

PhD topic

The project of the PhD tends to contribute to the race towards 5th generation (5G) telecommunication applications, which will be highly beneficial for society by opening wide possibilities for internet-of-things, data transfer, extreme device density, smart transport/cities and communication systems, etc.

The thesis subject aims to develop the technological integration of graphene on radiofrequency micro-acoustic systems based on piezoelectric materials. The use of graphene in filters, sources, and sensors with RF elastic waves has been explored since few years. However, the graphene transfer on the devices, the electrical interconnections, and the control of its properties present major challenges.

The candidate will work on all the technological stages of device fabrication: lithography, the development of transfer of high quality graphene monolayers, and finally, the characterization of the properties of electronic transport properties in the radio frequency domain. The project will contribute to the fundamental understanding of physical properties of graphene in radiofrequency electronics and consequently acoustical performances in order to enable advanced design of next generation technologies.

Knowledge of one of the themes of acoustic waves, micro-technologies, graphene or radio-frequency electronics would be an advantage. The candidate must have a Master degree,

engineer diploma or equivalent in a discipline such as physics, materials science, or electronics and show an interest in a multidisciplinary approach, know how to work in a team, but also, develop their personal thesis work.

PhD objectives

- Integration of graphene in micro-acoustic devices.
- Transport and electronic measurements in radiofrequency.

Selection procedure:

Starting offer: April 18th 2020

End of the reception process: May 15th 2020

Response to the candidates: June 2020

Starting date: October 1st 2020

Offer requirements

Education level: Master degree or equivalent in Material Science/ Physics / Electronic or a related subject, which formally entitle to embark on a doctorate;

Qualifications & experience:

- Fluent English (oral and written); PhD thesis can be written in English;
- Excellent IT skills (Microsoft office, image editors);
- Background and expertise in the field of Materials Science / Physics / Electronic;
- Experience microfabrication (optional)

Personal skills:

-High motivation, excellent interpersonal skills, good time and stress management, excellent written and oral skills.

How to apply :

CV, motivation letter, ID, recommendation letter from Master supervisor, official transcripts of master (1st and 2nd year) and bachelor/license records and rankings (including total number of students in cursus) have to be emailed to samuel.margueron@ens2m.fr .

Interviews will be done through remote visioconferences during the selection process until the end of May. Some preparation documents will be sent to selected candidates before the interviews.

Dr. Samuel Margueron
Associate Professor
Institut FEMTO-ST, ENSMM
26 rue de l'Épitaphe
25030 Besançon
France