Post-doctoral position

Fixed-term contract

Project title	**Localized electronic states in semiconductor quantum structures and devices**
General information	***Workplace* : Laboratoire de Physique de la Matière Condensée (LPMC), Ecole polytechnique, Palaiseau (France)** ***Date of publication : 15/11/2020*** ***Type of contract : 1 year fixed term with possible extension to 2 years.*** ***Contract period : 1 year initially*** ***Expected date of employment : 2021 with a possible extension to 2022*** ***Proportion of work: 100 % (e.g. full-time = 100%)*** ***Remuneration : 2600 € to 3400 € per month depending on prior experience*** ***Desired level of education : minimum requirement, Ph.D. in a field related to semiconductor physics*** ***Required experience: previous experience in a research setting outside France would be an advantage***
Research project	The candidate will participate in the research activities of the Electrons-Photons-Surfaces (EPS) Group of the LPMC which focus on the study of carrier localization effects in semiconductor quantum structures. The project is mainly dedicated to the study of nitride semiconductor structures that constitute the active part of devices for lighting (LEDs, lasers) in order to reach the ultimate performance in energy savings. In these compounds, the intrinsic alloy disorder due to the random positioning of alloy atoms is responsible for potential fluctuations that induce carrier localization at the scale of a few nanometers. From the technological point of view, this issue is crucial since there is growing evidence that localization effects play a major role in the performances of nitride optoelectronic devices. From the fundamental point of view, these localization effects constitute a new quantum system the properties of which are governed by the disorder at ultimate scale. The proposed project will explore the fundamentals of electronic processes in the presence of localization induced by alloy disorder as well as the quantum properties of the localized states for the generation of single photon sources and eventual entangled photon states. In order to carry on this project, the candidate will have access to a set of optical spectroscopy and microscopy techniques: micro-luminescence spectral imaging, high-resolution resonant photoluminescence spectroscopy and scanning tunneling electro-luminescence microscopy (STL). In particular, STL offers a particularly relevant approach since it gives access to electronic processes at the scale of a few nanometers which corresponds to the characteristic size of localization domains. The project is part of an international collaboration between ten institutions in the USA and in Europe, funded by the Simons Foundation (*Simons collaboration on localization of waves*). The collaboration includes experimentalists experts in semiconductor science and technology as well as theoreticians and mathematicians. This provides a stimulating international and multi-disciplinary environment for a young scientist.
Assignment	The candidate will carry on the project described above and will contribute to the supervision of PhD and Master students involved in this project. The candidate will also potentially participate to other projects of the EPS group related to localization effects in other semiconductor systems such as diluted nitrides, where localized states are responsible for spin-dependent recombination effects or 2D TMDs, where vacancies and alloying induce localization. He/she will also have the latitude to develop his/her own research direction. This position would therefore be suitable for someone interested in applying later for a permanent position at the CNRS.
Skills	The successful candidate will have a strong background in semiconductor physics or quantum spectroscopy with a Ph.D. level qualification in these or related areas. Prior experience with scanning probe and/or optical spectroscopy techniques would be a significant advantage. The candidate should be able to provide proof of his/her ability to formulate a scientific project, and to publish and promote his/her research. An aptitude for work in a team environment is essential.
Work environment	LPMC is one of 22 laboratories located within Ecole polytechnique's research centre, with expertise in the nanosciences and in the physics of disordered systems. The laboratory is jointly run by the Ecole polytechnique and the CNRS, France's national scientific body. The EPS group is looking to renew its permanent scientific faculty over the coming years, and as such a successful post-doctoral scientist should envisage a possible application for tenure with the CNRS.
Constraints and risks	The post-doctoral scientist will have the opportunity to present his/her results not only within France, but in the setting of international conferences. Periods of travel within, and outside, France should therefore be envisaged.
Supplementary information	**Contacts : Jacques Peretti (jacques.peretti@polytechnique.edu)** **Claude Weisbuch (claude.weisbuch@polytechnique.edu)** **For further information regarding :** **- the LPMC of Ecole polytechnique, visit the website https://pmc.polytechnique.fr/** **- the Simons collaboration on "Localization of Waves", visit the website https://cse.umn.edu/wave**