

18-month research engineer position to develop metamaterial devices for photovoltaics and photodetection

Employer: Centre National de la Recherche Scientifique (CNRS)

Host institute: Laboratoire Matériaux et Phénomènes Quantiques (MPQ), Paris, France. Website: <https://www.mpq.u-paris.fr/>

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To apply: [click here](#)

Missions

We are seeking to hire a research engineer for the 18-month duration of the ERC Proof-of-Concept grant AMELI (principal investigator: Aloyse Degiron). AMELI aims at developing a family of out-of-equilibrium carrier devices that operate on a metamaterial technology discovered by the PI during the course of his ERC-CoG project. This technology does not rely on a P-N junction (or one of its derivatives) to create electricity, giving access to a parameter space that is different from that of traditional devices. The research engineer who will be hired will assess the potential for disruption of this approach, maximize the performances and propose a first photovoltaic or photodetector prototype at the end of the project.

Activities

The work will encompass electromagnetic simulations, nanofabrication and optical and electrical characterization of innovative photovoltaic devices and/or photodetectors. Electromagnetic simulations will be performed with commercial code (Comsol). Nanofabrication will include fabrication steps in a cleanroom (optical and e-beam lithography, metal and dielectric deposition) and others in a glovebox. The devices will be characterized with sourcemeters (I-V curves, transfer curves in FET configuration), optical photoluminescence benches and a small solar simulator.

The general workplan is to build on the preliminary results already gathered by the team who has demonstrated an original way to generate electricity with layers of colloidal quantum dots interacting with judiciously designed metamaterials. The first weeks/months will be devoted to perfect the understanding on the first generation of devices and to assess their limitations and potential for photovoltaics and/or photosensing. Next, improvements or radical rethinking of the concept will be made, so as to choose the right set of active material, metamaterial geometry and architecture to maximize the efficiency of the devices. Finally, one or more proof-of-concept demonstrators will be fabricated and characterized. Patenting and writing scientific papers is expected along the way.

Skills

We are looking for a highly motivated individual with both numerical and experimental skills. A previous experience in cleanroom fabrication, quantum-dot based optoelectronics and/or photovoltaics is a requisite. A strong aptitude for working autonomously would also be highly valued. Moreover, the successful candidate should possess high proficiency in effectively communicating his/her findings through patents and scientific papers.