**Proposition de stage / Internship proposal**

*Date de la proposition : 08/11/2022*

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| **Responsable du stage** */ internship supervisor*:  |
| Nom / *name*:  | Gamby | Prénom/ *first name* :  | Jean |
| Tél : 0170270670 | Courriel */ mail*:jean.gamby@c2n.upsaclay.fr |
| **Nom du Laboratoire** / *laboratory name*: Centre de Nanosciences et de Nanotechnologies (C2N) |
| Etablissement / *institution* : CNRS /U Paris-Saclay  | Code d’identification : UMR9001 |
| Site Internet / *web site*: https://www.c2n.universite-paris-saclay.fr/en/ |
| Adresse / *address: 10, boulevard Thomas Gobert, 91120 Palaiseau*  |
| Lieu du stage / *internship place*: Palaiseau |

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| **Titre du stage** / *internship title*: **Development of microfluidic devices for multiplexed RNA release and detection by coupling magnetic hyperthermia and electrochemistry on chip for early diagnosis** |
| Résumé / *summary***Project.** Our team has developed and patented an innovative method for the detection of RNA, a powerful biomarker used for the detection of different diseases. This method is based on two elements: magnetic hyperthermia and electrochemical detection and, unlike existing methods such us PCR, does not rely on the amplification of the RNA but it does on its preconcentration offering several important advantages.The goal of the internship is to contribute to the microdevice architecture and testing capture, release and detection procedures using a recent autonomous instrument that implements a patented protocol for the multiplexed detection of RNA. A first functional prototype has already been developed and it is used by the team. The role of the successful candidate will be to propose and implement innovative solutions to optimize devices, develop new functionalities and test the different elements of the system. Successful candidate will develop the next tasks:* Familiarization with the system by performing measurements using existing prototype (nanoparticles and microelectrodes functionalization) as well as laboratory instrumentation (hyperthermia and electrochemistry).
* Propose and develop innovative solutions to improve the self-diagnostics and auto-calibration capabilities of the system.
* Improve the user graphic interface (GUI) and stablish new communications between the system the GUI.
* Perform the microfabrication steps in cleanroom and validate performances of the whole system.

**Profile of the candidate*** Master student (M2) in Physics, Chemical or Physical Engineering, Microfluidics, etc.
* Knowledges and strong interests for micro and nanodevice for biology and diagnostic.
* Experience in programming (Labview, Python, etc.), *not mandatory*.
* Skills in numerical calculation (Comsol or others finite elements), *not mandatory*
* Complementary competences
	+ Basic knowledge on electrochemistry
	+ Micro and nanofabrication: photolithography, PDMS molding, 3D design/printing experience

**References articles : *Patent****.* [*WO/2019/068844*](https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2019068844&_cid=P21-K5KZUA-08634-1)*,* ***2019****. Article* Sensor, 2021, 21(1), 185, 1-18.<https://hal.archives-ouvertes.fr/hal-03116605v1> |

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| **Ce stage pourra-t-il se prolonger en thèse ?** *Possibility of a PhD***? : YES****Si oui, financement de thèse envisagé ou acquis /** *financial support for the PhD***?** |
| Financement acquis / *Secured funding* | NO | Nature du financement */Type of funding* |  |
| Financement demandé / *Requested funding* | YES | Nature du financement */Type of funding* | Doctoral SchoolANRLABEX |