



**Postdoctoral position in Chemistry** at the interface of **synthesis / biology** for the development of **anticancer theranostic compounds** (M/F)

Duration: **1 year + 2 years renewal upon success.**

Research program: **Development of actuatable theranostic prodrugs for cancer treatment in deep tissues** funded by the French National Cancer Institute.

Location: **Institut Curie**, Campus Universitaire, Bat. 110-111-112, 91898 Orsay (Paris area), in the Unit « Chemistry and Modelling for biology of cancer (UMR9187).

Employment Type: Full time.

Salary: From 2890 to 4083 €/m gross salary, adapted to the experience of the candidate.

Closing date: Tuesday 3<sup>rd</sup> March 2023, with interviews for shortlisted candidates to be held as soon as possible thereafter.

Application at <https://t.co/J0QHK4I39L>

### **Mission:**

The possibility to **control the activation of treatment in space and time *in vivo*** has mobilized considerable efforts in the last 20 years. **Externally triggered theranostic prodrugs** are one of the most promising tools in this field. In particular, photosensitive prodrugs and nanoobjects showed great promise for spatio-temporally controlled and non-invasive activations *in vivo*. However, to date, most of the photosensitive systems described can only be activated by UV to near-IR lights. This limits *in vivo* activation to few millimetres below the skin, which hugely restrains clinical applications, mainly to ophthalmology or skin treatment. **To date, there is no non-invasive approach for using light-sensitive materials in deep tissues.**

The project takes part in the development of tools able to provide **treatment in deep tissues** in a **space- and time-controlled resolution**. **Theranostic prodrugs** detectable by nuclear magnetic resonance imaging (**MRI**) and able to be activated by **radiotherapy clinical beams**, will be developed. This project, based on activation techniques relying on already-available clinical infrastructures, is consistent within the perspective of future developments of molecular systems for clinical applications. The **chemical** (prodrug synthesis), **physical** (activation mechanism, ultrafast spectroscopy) and **biological** (cell-death mechanism, therapeutic effect) **locks will be investigated**. The postdoctoral researcher will join the laboratory “Chemistry and Modelling for Biology of Cancer” at Institut Curie (Orsay) in will be supervised by Dr Guillaume Bort.

### **Job description:**

The project consists in **synthesizing theranostic prodrugs** for cancer treatment, adapted for MRI monitoring and for activation upon radiotherapy.

Both **physical and biological mechanisms** leading to prodrug activation and cell toxicity respectively, will be investigated. A **good expertise in synthetic organic chemistry** will be valued and combined with various characterization techniques in collaboration with several groups with high expertise in **physic and biology**.

Specific Responsibilities:



- Synthesis of theranostic prodrug using organic and inorganic chemistry.
- Prodrug activation and assessment of photophysical properties.
- Investigation of stability/activation/diffusion in biological environments, cytotoxicity and immunogenicity.
- Bringing forward ambitious and realistic design of new compounds, synthesis pathways, characterization techniques; being proactive and taking the lead.
- Participation in the supervision of PhDs, engineers, and trainees.
- Restoring the results to collaborators and communication at international conferences, participation in writing of scientific manuscripts.

### **Required Skills:**

You should hold a **PhD in organic chemistry, chemical biology or polymer chemistry**. Prior experience in **cell biology**, fluorescence microscopy, flow cytometry, formulation/nanoparticle and/or data analysis (Python, etc.) would be appreciated, but are not essential. We are seeking a motivated individual with well-developed scientific skills and a desire to tackle technical and scientific complex problems to potentially make breakthrough innovation in medical treatments, and with a **strong interest in multidisciplinary approach**. The ability to work effectively as part of a team and to perform both self-directed and guided research are required. Excellent English oral communication skills, ability to write for publication and a great team spirit are a must.

This project will give great opportunities to **develop competences** in organic/inorganic chemistry, physics of radiations, cell biology and associated characterization techniques. You are expected to be **highly motivated** to take advantages to work in a leading research environment, to benefit from a **multi-collaboration context**, and to potentially participate in the **valorisation phases** (patent, etc.) of this project.

### **Scientific environment:**

A leading player in the fight against cancer, Institut Curie brings together an **internationally-renowned Research Center** and an **advanced Hospital Group** that provides care for all types of cancer. Founded in 1909 by Marie Curie, Institut Curie comprises three sites (Paris, Saint-Cloud and Orsay), where more than **3,500 members of staff** are dedicated to achieving three objectives: **hospital care, scientific research**, and the **sharing** of knowledge and the preservation of legacy. As a private foundation that is recognized as serving the public interest, Institut Curie is supported by donations and grants. This support is used to fund discoveries that will **improve treatments** and the **quality of life of cancer patients**. The successful candidate will benefit of a vibrant environment based on the **pluri-disciplinary approaches** and excellence offered by over 85 research groups constituting the Institut Curie.

The project related to this position is currently supported by several collaborations gathering different expertises such as molecular observation at the attosecond-timescale resolution using **ultrafast spectroscopy**, *in vitro* and *in vivo* assessment of **immunogenicity** and **therapeutic effect**, and development of **machine-learning algorithms** and **density functional theory models**. The postdoctoral researcher will be at the **interface of all these approaches** and will have some **opportunities to take part** in several collaborative studies.



**Risks:**

No specific risk. Chemical and biological products will be handled with appropriate safeguards.

**Contact:**

If you need more details, please contact Dr Guillaume Bort ([guillaume.bort@cnrs.fr](mailto:guillaume.bort@cnrs.fr)). The applications should include at least the contact details of 2 referees and it should be submitted using the CNRS job platform at <https://t.co/J0QHK4139L>.