

## Position Description

### 1. General Information

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| <b>Name of the position</b>      | <b>Functional porous hybrid 2D materials</b>  |
| <b>Foreseen enrolment date</b>   | 1 July 2024   |
| <b>Position is funded by</b>     | <ul style="list-style-type: none"> <li>• COFUND, Marie Skłodowska-Curie Actions (MSCA), Horizon Europe, European Union</li> <li>• FR Partner: UNISTRA</li> <li>• AU University: UNSW</li> </ul> |
| <b>Research Host</b>             | University of Strasbourg  |
| <b>PhD awarding institutions</b> | University of Strasbourg & UNSW   |
| <b>Locations</b>                 | Primary: Strasbourg, France<br>Secondary: Sydney, Australia   |
| <b>Supervisors</b>               | Paolo Samorì (UNISTRA)<br>Liming Dai (UNSW Sydney)  |
| <b>Group of discipline</b>       | Nanoscience, low-dimensional materials, carbon nanomaterials, energy storage, sensing, catalysis  |

### 2. Research topics (only one of these projects will be funded)

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| <p><b>Project 1: Porous hybrids for advanced applications in electrocatalysis</b></p> <p>The purpose of this Ph.D relies on the generation of novel advanced hybrid materials with tailored-made properties for applications in electrocatalysis. Towards this end, hybrids architectures comprising transition metal dichalcogenides tethered with suitably designed molecules will be employed to achieve a highest control over the structure and porosity. The physical and chemical properties of the hybrids will be studied and optimized for advanced applications in electrocatalysis.</p> <p>Skills: 2D materials, electrocatalysis, multiscale characterization of functional materials.</p> <p><b>Supervisors:</b> Paolo Samorì (UNISTRA), Liming Dai (UNSW Sydney), Francesco Bonaccorso (BeDimensional, Italy)</p> <p><b>Research Fields:</b> 2D materials, supramolecular chemistry, electrocatalysis</p> |
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#### Project 2: Porous hybrids for high-performance chemical sensing

The purpose of this Ph.D relies on the generation of novel advanced hybrid materials with tailored-made properties for applications in (electro)chemical sensing. Towards this end, porous covalent networks of 2D materials comprising specific multiple receptors of the analyte of choice will be fabricated and fully characterized. (Electro)chemical sensors, capable to detect multiple analytes, with electrical readout will be developed and optimized to maximize sensitivity, selectivity, response and recovery time.

Skills: 2D materials, (electro)chemical sensing, multiscale characterization of functional materials.

**Supervisors:** Paolo Samorì (UNISTRA), Liming Dai (UNSW Sydney), Francesco Bonaccorso (BeDimensional, Italy)

**Research Fields:** 2D materials, supramolecular chemistry, (electro)chemical sensing

#### Project 3: Porous hybrids for high-performance energy storage

Novel generation of highly porous, heteroatom rich network of 2D materials forming 3D architectures with controlled structure and functionality will be developed and their properties investigated via multiscale characterizations. Prototype of supercapacitors/batteries will be fabricated and optimized.

Skills: 2D materials, fabrication and testing of supercapacitors and batteries, multiscale characterization of functional materials.

**Supervisors:** Paolo Samorì (UNISTRA), Liming Dai (UNSW Sydney), Francesco Bonaccorso (BeDimensional, Italy)

**Research Fields:** 2D materials, supramolecular chemistry, energy storage

### 3. Employment Benefits and Conditions

University of Strasbourg offers a 36-months full-time work contract (with the option to extend up to a maximum of 42 months) with 2 month probation period. The total working hours per week is 36h.

The remuneration, in line with the European Commission rules for Marie Skłodowska-Curie grant holders, will consist of a gross monthly salary of 2,380 EUR. of this amount, the estimated net salary to be perceived by the Researcher is 1,870 EUR per month. However, the definite amount to be received by the Researcher is subject to national tax legislation.

#### Benefits include

- Becoming a Marie Skłodowska-Curie fellow and be entitled to join the Marie Curie Alumni Association
- Access to all the necessary facilities and laboratories at University of Strasbourg and UNSW Sydney (including photoelectron spectroscopies (XPS, UPS), advanced scanning probe microscopies for visualization, quantitative study of various physicochemical properties and manipulation, tools for exploring I-V characteristics of nanostructures, as well as transistors, light-emitting devices, supercapacitors and batteries fabrication). The candidate will also have access to the educational resources at UNISTRA and UNSW.



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- Tuition fees exemption at both PhD awarding institutions
- Yearly travel allowance to cover flights and accommodation for participating in AUFRANDE events
- 10,000 EUR allowance to cover flights and living expenses for up to 12 months in Australia
- 36 days paid holiday leave
- Sick leave
- Parental leave

## 4. PhD enrolment

Successful candidates for this position will be enrolled by the following institutions and must comply with their specific entry requirements, in addition to AUFRANDE's conditions.

Applicants must hold a Master degree in science (chemistry, physics, materials science, nanoscience, engineering) with a substantial research component and demonstrated capacity for timely completion of a high-quality research thesis.

Applicants must demonstrate an English language proficiency equivalent to an overall IELTS score above 6.5 and no band below 6. Note that the test needs to be completed no more than two years before enrolment.

For more information about the tests accepted and scores required, visit:

<https://www.unsw.edu.au/study/how-to-apply/english-language-requirements>

### More information on Université de Strasbourg' requirements

To be admitted in first year of the Doctorate program, the applicants have to fulfill the following requirements:

- If the master degree is granted by a French university, the average master grade (calculated from the results of all 4 semesters) has to be at least equal to 12/20. Exceptionally, EDSC can accept candidates with a master degree with an average grade between 10 and 11.99/20 over the last 2 years (M1+M2) provided that the council delivered a positive evaluation after examination of the candidate's record
- Foreign degrees are examined by the doctoral schools to determine whether they are equivalent to a French Master degree.

Visit the website: <http://ed.chimie.unistra.fr/admission-des-doctorants/conditions-pour-etre-candidat/>

### More information on UNSW' requirements

Applicants will be required to submit an application on UNSW website in parallel.

Visit the website: <https://research.unsw.edu.au/higher-degree-research-programs>



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