

PhD contract offer

Carbon nanomaterial / metal hybrids as a new approach to produce nanostructured catalysts for greenhouse gas reduction

General information

Workplace: Nancy (France)

Type of contract: PhD at the University of Lorraine

Contract period: 36 months

Expected date of employment: October 2024

Proportion of work: Full time

Gross salary: 2100€/month

Desired level of education: Master of Science in Materials Science or in Chemistry of Materials

Experience required: physical chemistry, solid chemistry, nanomaterials

Work context

Designing new nanostructured materials in a controlled manner is of high interest to face and reduce global warming. In the current energy and environmental transition context, the future technologies need to incorporate materials whose the ratio “performance” over “raw material amount” has to be maximized. The sustainability of available metals has indeed to be fully taken into account. The case of the highly desired catalytic reaction for the dry (CO₂) reforming by methane or DRM we are interested in here, is no exception. The PhD project aims at proposing an alternative approach to the standard liquid-based synthesis methods so that nanostructured catalytic materials with a limited amount of raw metals and in a scalable and versatile approach will be produced in a better controlled approach. In this project, the proof-of-concept of this approach concerns atmosphere pollution by greenhouse gas reduction through production of efficient and stable catalysts for the DRM reaction.

The pioneered approach proposed in this PhD project is based on a modified thin film growth process occurring onto 2D multi-walled carbon nanotube (MWCNT) substrates we have recently put into evidence in our group. This method will be transferred to the Ni-Co system to produce Ni-Co bimetallic alloys which are of great interest for DRM. The present project gathers the complementary skills of 2 laboratories (Institut Jean Lamour, University of Lorraine (UL), Nancy, France and School of Chemical Engineering, Universiti Sains Malaysia (USM), Penang, Malaysia). We intend to cover the whole chain of the material designing from the synthesis to the application tests at the lab-scale. This project brings thus a new synthesis way which could be a real breakthrough in the catalysis domain.

Missions / Activities

The PhD work program consists i) preparation of 2D MWCNT assemblies; ii) Ni-Co synthesis by magnetron co-sputtering on 2D MWCNT surface; iii) characterization by a multi-characterization approach: electron microscopies, spectroscopies... iv) performances of Ni-Co bimetallic alloys for DRM in collaboration with USM, Malaysia.

Skills

Applicants must hold Master's degree in Materials Science or in Physics of Materials or in Chemistry of Materials. Previous experience in physical chemistry, solid chemistry, nanomaterials are welcome.

Applicants must be able to write scientific documents in English. Good technical writing and speaking are required in English.

Constraints and risks

The position you are applying for is located in a sector relating to the protection of scientific and technical potential. It therefore requires, in accordance with the regulations, that your arrival be authorized by the competent authority of the French Ministry of Higher Education, Research and Innovation.

Application

Dr. Brigitte VIGOLO (PhD supervisor)

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Please apply by e-mail. Send your application in a single e-mail containing your motivation for this offer, your marks during your Master degree and your CV (all files in pdf format).

About Institut Jean Lamour

The Institut Jean Lamour (IJL) is a joint research unit of CNRS and Université de Lorraine. Focused on materials and processes science and engineering, it covers: materials, metallurgy, plasmas, surfaces, nanomaterials and electronics. IJL has 263 permanent staff (30 researchers, 134 teacher-researchers, 99 IT-BIATSS) and 394 non-permanent staff (182 doctoral students, 62 post-doctoral students / contractual researchers and more than 150 trainees), of 45 different nationalities.

Partnerships exist with 150 companies and our research groups collaborate with more than 30 countries throughout the world. Its exceptional instrumental platforms are spread over 4 sites; the main one is located on Artem campus in Nancy.