

NOMATEN

Centre of Excellence in Multifunctional Materials for Industrial and Medical Applications

NOW HIRING

Postdoc positions Advanced Multifunctional Materials Science National Centre for Nuclear Research (NCBJ), Poland

NOMATEN Centre of Excellence (CoE) is formed through a scientific partnership between the National Centre for Nuclear Research (NCBJ-Poland), the French Alternative Energies and Atomic Energy Commission (CEA-France) and the Technical Research Centre of Finland (VTT-Finland) with joint financial support from the Foundation for Polish Science (FNP) and the European Commission. NOMATEN focuses research on the characterization, analysis and development of advanced multifunctional materials, specifically those designed to work in extreme conditions, with primary examples being radiation, high temperature and corrosion. Multiple positions exist on the PhD student levels in NOMATEN Research Groups. Below are topical projects in the groups:

Functional properties

group is studying impact of radiation damage on the mechanical and structural properties. Specific topics covering materials devoted to Gen. III+ and IV nuclear reactors like: stainless steels, ODS and HEAs, Al₂O₃ coatings, zirconium and nickel alloys will be proposed. Experiments will be conducted on ion damaged materials and at their working temperatures by using specific techniques like: nanoindentation, X-ray diffraction, tensile tests and Raman spectroscopy. Structural properties are determined by means of SEM/FIB/EBSD/EDS and TEM.

Manufacturing and mechanical properties of ODS-CSA materials. It is projected that nano-sized oxide particles introduced into CSAs should improve their mechanical and structural properties. Resulting oxide dispersion strengthened (ODS) concentrated solid-solution alloys (ODS-CSAs) may exhibit substantial performance improvement in extreme environments. Such ODS-CSAs may possess superior performance because they combine the advantages of CSAs and ODS materials. Full time position will be devoted to analysis/characterization of such materials. Understanding of the radiation damage resistance is one of our prime goals.

Second position will be devoted to studying functional properties of different bcc-type materials submitted to ion irradiation process. The goal of this work will be develop fundamental understanding why refractory HEAs with bcc lattice show less ductility, but they appear to have much higher yield strengths than fcc-type HEAs, even at high temperatures. Understanding of the impact of radiation damage will be one of the major challenges in this work. Candidate will be responsible for conducting complex mechanical and structural experiments by using nanoindentation, XRD and TEM devices on ion irradiated materials.

Mechanical property analysis for external partners (post-doc/senior-scientist) – the employed person will be responsible for conducting mechanical and structural analysis of the materials requested by the industrial partners. Most of the tests will be performed according to international standards. This person will also support head of the group in the organization of work.

Preferred background: materials science, materials engineering, nuclear engineering, mechanics.

Contact person: Lukasz Kurpaska (lukasz.kurpaska@ncbj.gov.pl)

Instructions to applicants:

The application must include the following documents in English:

- Cover letter that explains the motivating factors for considering the position (max. 1 pp)
- CV with complete publication list
- Brief description of important scientific achievements and scientific outlook (max. 2 pp)
- Two references letters arranged by applicants and directly submitted by the letter writers before the application deadline.
- PhD diploma copy/scan

The recruitment is open to candidates who, at the time of submitting their applications, do not have a diploma confirming PhD, but who have a fixed date for obtaining this title before the planned date of employment. In this case, it is necessary to provide documents prove that.

- As an attachment to your application please sign and enclose the following declaration: I agree to the processing of my personal data included in this application for the needs necessary to carry out the recruitment.

Applications should be sent before December 14th, 2021 to:
magdalena.jedrkiewicz@ncbj.gov.pl

Materials Structure, Informatics and Function:

Emulating the behaviour and performance of materials in mechanical loading applications, using multiscale material simulations, machine learning methods and material characterization techniques. Methods of interest: Ab-Initio Density Functional Theory (DFT), Molecular Dynamics (MD), Discrete Dislocation Dynamics (DDD), and Continuum phenomenological Plasticity and Damage (CPD) modeling.

Preferred background: multiscale modelling, mechanical characterization, applied physics/math, machine learning.

Contact person: Stefanos Papanikolaou (stefanos.papanikolaou@ncbj.gov.pl)

Complexity in Functional Materials:

mechanical properties (yielding, time-dependent fracture) to the role and understanding of the microstructure in determining such properties. We also work on Machine Learning approaches in complex materials. Key words of importance are metal alloys, and High-Entropy Alloys in particular.

Preferred background: statistical mechanics, computational simulations, machine learning

Contact person: Mikko Alava (mikko.alava@ncbj.gov.pl)

Materials Characterization:

The main goal of the group is to conduct advanced characterization of novel multifunctional materials ("process-structure-property") at the atomistic level using state-of-the art equipment. The focus is on studying the impact of high temperature, oxidizing atmosphere and radiation on the structural properties of materials using a wide range of techniques, including SEM/FIB/EBSD/EDX tools, TEM analysis, as well as advanced and in-situ X-ray diffraction and Raman spectroscopy. We have three (3) positions, with expectations of experience in SEM-FIB operation including EDS and EBSD analysis, structural analysis by XRD technique (in-situ at high temperature) or structural analysis by Raman spectroscopy in application to material science (joint experience would be an asset). The structural characterization fills the gap between simulations and functional properties of the material, by verification of the structural model, analysis of material response on various conditions occurring in real environments, analysis of mechanisms of damage accumulation and studies of microstructure influence on the mechanical properties.

Preferred background: physics, materials science, materials engineering, nuclear engineering.

Contact person: Iwona Józwick (Iwona.Jozwick@ncbj.gov.pl)

We offer:

- 11,250 - 15,000 PLN per month (at current exchange rate 2,400- 3,200 € per month); the details in each case depend on qualifications and experience, and the compensation is composed of the base salary, seniority addition, functional addition and project bonus)

Read more about contributions in Poland at

<https://www.ncbj.gov.pl/en/hrcareer/contributions-poland>.

- 2 years initial employment with extension after a positive evaluation.
- Work in international networks with research institutes and industrial companies.
- Access to the research potential of NOMATEN's three partners between NCBJ (Poland), CEA (France) and VTT (Finland).
- Travel funds for participation in conferences and collaboration, attractive working conditions, atmosphere of teamwork, family-friendly environment with flexible working hours. support of an experienced local team in legal, financial and organisational issues as well as logistic support and advice related to working in Poland - enabling smooth relocation and equal opportunities.