Chair in

Environmental Geochemistry

of Critical Metals

For more information:
http://www.ressources21.univ-lorraine.fr/
http://otelo.univ-lorraine.fr/

Deadline for project submission:
20 May 2014

Project Leaders

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A) GENERAL FRAMEWORK

This chair is offered by the **University of Lorraine** in the framework of the **LABEX RESSOURCES21**, Priority Research Action - PRA n°3 "Transfer and dissemination of strategic metals in the ecosphere: mechanism, ecotoxicological impact, and remediation strategies "

- *Background/Main subject*

The object of the chair is to generate new knowledge on thermodynamics, kinetics, mobility and biodisponibility of strategic metals in the ecosystem compartments according to the environmental factors.

The chair holder will be integrated in the Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC) for the duration of the contract.

- *The actors*

The University of Lorraine

A large multidisciplinary university, open to international collaboration

With more than 3,700 teaching and research faculty and approximately 53,000 students, including nearly 7,000 foreign students (key data 2013), the University of Lorraine (UL) is one of France's largest multidisciplinary universities. Its location in the heart of Europe, with borders on three European member states (Germany, Belgium and Luxembourg) offers to UL a privileged position for strong international partnerships.

LabEx RESSOURCES21

The LabEx RESSOURCES21 was selected by the French Ministry of Research and Education in the framework of the "Laboratoires d'Excellence" initiative. RESSOURCES21 proposes an integrated scientific and educational approach to the understanding, exploitation and environmental management of strategic metal resources for the 21th century. It is supported by four research laboratories of the Lorraine Earth and Environment Observatory-OTELo (Observatoire Terre et Environnement de Lorraine) and the teaching departments in Geoscience and Environment of the University of Lorraine.

The Lorraine Earth and Environment Observatory (Observatoire Terre et Environnement de Lorraine)

OTELo is an Observatory of Sciences of the Universe (OSU) CNRS-University of Lorraine established in 2010. OTELo is also the scientific pole of the University of Lorraine gathering research units in Earth Sciences in a broad sense around issues such as the dynamics of the Earth, the chemistry of the Earth's mineral and energy resources, the cycle of resources and waste disposal in deep geological environment, hydro, land soil and sub-soil, environmental management of land resources, water, ecotoxicology and biodiversity.

As an Observatory of Sciences of the Universe, OTELo's mission is to contribute to the advancement of knowledge through the:

- acquisition of observational data;
- development and operation of means of observation : experimental and monitoring infrastructures as GISFI (French Scientific Interest Group - Industrial & Wasteland soils), long-term environmental research monitoring and testing system (OPE), testing river system (ZAM), analytical platform;
- development of theoretical tools.

The observatory is also responsible for:

- providing services related to their research;
- providing training for students and research staff;
- ensuring the dissemination of knowledge to society;
- developing cooperation activities at national and international level.

Since January 2013, OTELo brings together four research units and two joint and national services units:

- Petrographic and Geochemical Research Centre-CRPG;
- Laboratory for geological resources-Georessources;
- Interdisciplinary Laboratory for Continental Environments-LIEC;
- Soils and Environment Laboratory-LSE;
- National Service for the Analysis of Rocks and Minerals-SARM;
- National Ion probes.

The Interdisciplinary Laboratory for Continental Environments (LIEC)

The primary objective of LIEC is to understand the functioning of continental environments strongly impacted by human activity, in order to contribute to their rehabilitation. In this purpose, we implement an interdisciplinary research, allying the concepts and methods of environmental mineralogy, soil science, microbial ecology, colloidal physicochemistry, ecotoxicology, functional ecology.

The scientific activity of the LIEC is structured in five scientific themes:

- Eco-dynamics and ecotoxicity of contaminants;
- Functioning of perturbed ecosystems ;
- Diversities and biotoc/abiotic interactions;
- Theory and integrated modelling of systems;
- Characterization and remediation of anthropised ecosystems.

The LIEC consists of 89 permanent staff (42 professors and assistant-professors, 14 CNRS researchers, 33 technical staff), 31 doctoral students and 5 post-doctoral researchers.

B) JOB SUMMARY

- *General description*

To meet the growing needs in metallic materials and high technology manufactured products, a number of metals (Li, Co, Ni, Ge, Nb, In, Sb, Cr, Ta, Re, Pd, REE, U, Th, etc.) became strategic in recent years. The extraction routes, purification and recycling of these metals contribute to their growing presence in the environment. However, very little information is available on their chemical and physical behavior, their dissemination and impact on the functioning of ecosystems. It is therefore essential to develop research on the physico-chemical behavior of these metals in the environment in order to better assess their potential for interaction with terrestrial and aquatic (micro-)organisms and the risk of (eco)-toxicity. The present chair in **Environmental geochemistry of critical metals** aims at studying the mechanisms of transfer and dissemination of strategic metals in the biosphere and continental environments.

The scientific project will integrate the research themes of the LIEC, in particular Ecodynamics and toxicity of contaminants and will be an integral part of the LabEx RESSOURCES21 scientific strategy . In this respect, the research will provide conceptual and factual elements to better define the speciation and hence the physicochemical and/or ecotoxicological behavior of strategic metals in continental ecosystems (soils and lotic systems) or at the scale of experimental microcosms (soil-plant-microorganism, organism-water, etc.).

Besides the classically studied and relatively well documented metals (Cu, Pb, Cd, Zn, Co, Ni, As, Sb, etc.), the chemical behavior of certain strategic metal elements, mostly trivalent and hydrolyzable (lanthanides, Sc, Ge, Ga, In, Al, Cr, etc.) is poorly known. Particularly, the reactivity and solubility of complexed or polymerized (colloidal or molecular) forms still remain unknown from the mechanistic, thermodynamic and kinetic point of view.

➢ *Responsibilities*

The chair holder will be responsible for:

- within the framework of the LabEx RESSOURCES21 and the LIEC, defining a short-list of strategic metals whose knowledge is to develop;
- initiating and developing research on the physicochemical behavior of strategic metals in environmental conditions, including estimation of the thermodynamic and/or kinetic constants of complexation in solution, the characteristic times of interaction of these metals with biocolloids and living tissues, the determination of critical or speciation conditions for ecotoxicologic investigations;
- increasing the knowledge on the relationship between speciation and disponibility in complex systems;
- initiating and developing innovative approaches in methodology, theory and modeling;
- participating in training programs provided by the University of Lorraine on a basis of 30 hours/year (Master degree, engineering school and PhD). Teaching subjects should be linked to environmental chemistry of metals, including concepts, methods and models for ecodynamics, bioavailability and ecotoxicity.

➢ *Professional statute and conditions*

The University of Lorraine is offering a Professor contractual job. The chair holder will be recruited as a "University of Lorraine employee", under a three-year contract.

Salary: negociable based on skills and experience
Operating budget: 10 000 € per year
Integration: the chair holder will be integrated in the LIEC for the duration of the contract

Thanks to this financial support, the chair holder will be able to find additional funding (e.g. ANR, Région Lorraine, LabEx RESSOURCES21…) for hiring PhD- and post-doctoral students, and for purchasing analytical and experimental equipment. Therefore, the chair holder will have to develop knowledge of the French research, academic and others, in the perspective of research collaborations, and incidentally possible sources of funding.

C) REQUIREMENTS AND TARGETED PROFILE

Applicants must:

- hold a PhD diploma;
- justify recognized skills in the fields of Environmental chemistry, (bio)geochemistry, physicochemistry;
- demonstrate excellent knowledge of the state of the art in the field of environmental chemistry;
- demonstrate that he/she distinguishes him/herself as a world-class researcher or as a leader in his field;
- present a project and a research program of international standard;
- be fluent in one of the working languages of the host laboratories: French or English.

Complementary skills and competences in modeling will be appreciated.

The project will include an estimation of the scientific and human resources required for the achievement of the objectives.

D) HOW TO APPLY

Please send the following documents by E-mail to ressources21-contact@univ-lorraine.fr:

1. the information sheet;
2. a curriculum vitae;
3. a cover letter;
4. a list of publications;
5. a detailed research project proposal (context, objectives, methodology and calendar of actions - 5 to 10 pages) in English or in French;
6. an estimation of necessary technical and human resources.

NB: If your files are too large, please send it to: nathalie.carol@univ-lorraine.fr

E) STEERING COMMITTEE

The steering committee will select the candidate who best meets the requirements listed above.

Name	Research field / Skills	University / Company / Organisation
Michel CATHELINEAU	Metallogeny, mineralogy	Géoressources – LabEx RESSOURCES21
Laure GIAMBERINI	Ecotoxicology	LIEC – LabEx RESSOURCES21
Fabien THOMAS	Colloidal Physico-chemistry	LIEC
Christian MUSTIN	Biogeochemistry of soils	LIEC
Jérôme ROSE	Colloidal Physico-chemistry	CEREGE – Aix-en-Provence
Aline DIA	Aquatic Geochemistry	Géosciences - Rennes
Arno GUTLEB	Ecotoxicology	CRP-Gabriel Lippmann - Luxembourg

F) CALENDAR

- Deadline for application: Tuesday 20th of May
- Interview of the selected candidates by the steering committee on 25th June 2014
- Results in early July 2014
- Beginning of contract September 2014
- Yearly simplified activity report (final quarter of every year)
- Mid-term and final comprehensive activity report

G) CONTACTS

For more information, please contact
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INFORMATION SHEET

Title:	.....	Position	.....
First Name:	.....	Family Name:	.....
Date of Birth:	.....dd/mm/yyyy.....	Gender:	☐ M ☐ F
Country of Citizenship:	.....	Region:	.....
Country of Residence:	.....	Street:	.....
City:	.....	State:	.....
Zip:	.....		.....
Work phone number:	.....	Personal phone number:	.....
Work Email:	.....	Personal Email:	.....
Name and address of employer	.....		
Current position	.....	Rank / grade	.....
Research discipline:	.....	Area of application:	.....
Current research subject	.....		
Research project summary Provide a 100 word summary, describing the research program. This summary may be used for publicity purposes.	.....		

Keywords Provide keywords which describe the proposed research program	…… ……