
Postdoc position available in physical chemistry of minerals surfaces and liquid phase adsorption

Froth flotation is one of the most used methods worldwide for the extraction of metals from rocks as it allows the separation of the metal-bearing mineral from the gangue (unvaluable) minerals. More than 2 billion tons of ores are processed every year by this solid/solid separation technique worldwide. Froth flotation is based on the selective adsorption of various reagents from the aqueous phase onto the surfaces of the target minerals (generally the metal-bearing minerals) in order to modify their surface tension and to recover them by injecting air bubbles. The increasing demand in metals, associated with a constant decrease in ores quality and an increase in environmental standards, requires the development of innovative reagents formulations to make exploitable deposits that are still considered as non-exploitable. Hence, it is of paramount interest to gain understanding in the fundamental mechanisms involved in the flotation process, still poorly understood, to intensify the innovation in reagents formulations. It is the objective of the industrial chair MULTIMINES, co-funded by ArcelorMittal and focused on iron ores, within which this postdoctoral position falls. The recruited researcher will carry out experimental work divided as follows:

- Analyzing the main exposed surfaces of the four considered minerals (quartz, kaolinite, magnetite, and hematite) from a crystallographic point of view to characterize their heterogeneity.
- Determine the speciation of the chemical groups exposed on those surfaces as a function of the pH of the aqueous phase.
- Realizing and analyzing adsorption experiments to quantify the adsorption capacity and enthalpy (adsorption isotherms, calorimetric measurements) for selected flotation reagents (including ions).
- Unravel the synergistic effects related to the use of reagents mixtures, from a physical-chemistry point of view.
- Determine the adsorption mechanisms and the fundamental mechanisms leading to the formation of a self-assembled adsorption layer on the mineral's surfaces.

The successful candidate will work at [GeoRessources](#) (UMR 7359) in Nancy, with Dr. Yann Foucaud, in collaboration with the [LPCT](#), with Dr. Michaël Badawi, and with the research center of [ArcelorMittal](#). The candidate will also work in close collaboration with other colleagues from University of Lorraine (LIEC) and from University of Montpellier (ICGM). The candidate must have:

- A PhD in chemistry, physical chemistry, geosciences, or materials science.
- A strong background in adsorption with knowledge related to mineral surfaces and their physical and/or chemical properties.
- Skills in surface spectroscopies (DRIFTS, XPS) and analytical methods (GC-MS, TD-MS)
- Skills in microscopy (SEM, TEM, AFM, STM) will be welcomed
- Ability to work in multidisciplinary projects merging experimental and theoretical chemistry.
- Ability to work independently and integrated in a research team.
- Be highly motivated and have a strong commitment to research,
- Excellent oral and written communication skills in English, required to prepare publications in world-class journals and to present research at international conferences.

The position is available starting Jan. or Fed. 2023 and lasts for 12 months renewable two times (up to 36 months). The net salary will depend on experience of the candidate (minimum 2050 euros/month net). Candidates should provide a CV, a letter of motivation, and the names and e-mail addresses of 2 references to Yann Foucaud (yann.foucaud@univ-lorraine.fr) and to Michaël Badawi (michael.badawi@univ-lorraine.fr).