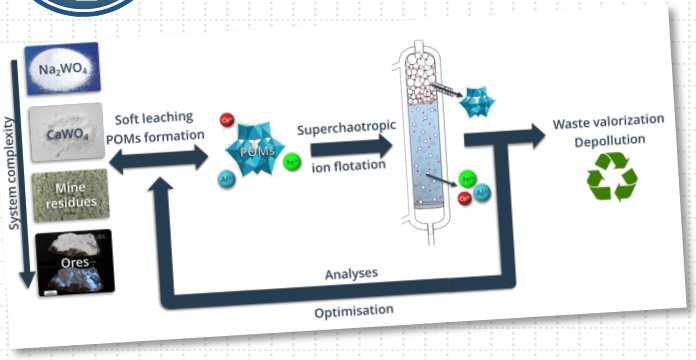
PhD DEFENSE



Valentin LEGRAND

Ions at Active Interfaces (L2IA)

Green process for cleaning up mining sites: Superchaotropic separation of tungsten/molybdenum using foams

Tuesday, January 13, 2026

9:00 AM

Auditorium ICSM

This thesis develops a low-impact approach for recovering tungsten from mine residues containing scheelite, based on the formation of superchaotropic polyoxometalates and their separation by foams. under soft acidic leaching conditions by H_2SO_4-H_3PO_4 controls the speciation toward the Keggin-type phosphotungstate $H_3PW_{12}O_{40}$ (HPW), confirmed by UV-Vis and ^{31}P NMR, and quantified by SAXS which highlights molecular species in solution. An optimal acidity window favors HPW while limiting the concurrent precipitation of H_2WO_4 and $CaSO_4$. Superchaotropic flotation using non-ionic surfactants, notably C_8G_1, takes advantage of the strong adsorption of POMs on neutral micelles at the air/water interface and enables the selective extraction of tungsten, with demonstrated selectivity over Ca^{2+}. In real matrices, the presence of Fe^{3+} is critical since it leads to Fe(III)-POM species detected by UV-Vis and impairs foam stability. Conditioning of the medium through selective iron precipitation with ferrocyanide restores foam stability and extraction efficiency without depleting HPW in solution. Application to Salau residues demonstrates the feasibility of an integrated sequence combining mild leaching, targeted iron removal and interfacial foam separation, opening an operational perspective for tungsten recovery.

Keywords: Scheelite; Lixiviation; Separation; Foam; Polyoxometalates; SAXS

WE LOOK FORWARD TO SEEING MANY OF YOU!