

A **PhD position** is available at **UCEiV** (<https://uceivfr.univ-littoral.fr/>) as part of the PUVAFIN project funded by the “Fond pour une Transition Juste” (FEDER).

Development of new bio-based solvents for VOC absorption using TERRAO® technology

CONTEXT AND OBJECTIVES

In response to industrial emission standards, gas-liquid absorption is widely used for trapping Volatile Organic Compounds (VOCs). However, traditional water-based scrubbing is ineffective for hydrophobic contaminants like toluene. This thesis project focuses on developing versatile scrubbing solvents such as Deep Eutectic Solvents (DESs), vegetable oils, and bio-based commercial solvents to increase VOC solubility significantly compared to water. These solvents will be integrated with **Terrao®** technology, which offers compact gas absorbers requiring smaller solvent volumes for industrial sites. The goal is to overcome current barriers in VOC remediation by optimizing both the materials and the operating parameters.

RESEARCH MISSIONS

The candidate will focus on the following tasks at both laboratory and industrial pilot scales:

- **Selection of bio-based solvents:** Characterizing natural solvents derived from biomass (density, viscosity, and thermal stability).
- **Solubilization studies:** Determining partition coefficients (K) using static headspace coupled with gas chromatography (HS-GC) to evaluate solvent-solute affinity.
- **Dynamic absorption:** Monitoring VOC solubilization in a lab-scale set-up using on-line analyzers and micro-GC.
- **Regeneration and recycling:** Evaluating solvent lifespan through multiple absorption/desorption cycles and assessing chemical stability via NMR and IR spectroscopy.
- **Industrial validation:** Testing the most promising systems on a semi-pilot scale in partnership with **STARKLAB**.

DESIRED SKILLS

Master's degree (or equivalent) in Chemistry, Chemical Engineering, or Materials Science. Experience in physicochemical characterization (GC, FTIR, NMR), inorganic synthesis, and conducting absorption tests is required. Ability to summarize work for frequent exchanges with industrial partners and academic rigor for writing scientific articles. Fluency in scientific English (written and spoken).

PRACTICAL INFORMATION

- **Location:** UCEiV MREI 1 ULCO, 145 Avenue Maurice Schumann, 59140 Dunkerque, France.
- **Duration:** 36 months.
- **Start Date:** Scheduled for May 1st, 2026.

Applications must be sent by e-mail before February 28, 2026, including a cover letter, CV, copy of M2 degree, and contact details for two academic referees to:

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