



Horizon Europe, Marie Skłodowska-Curie Doctoral Networks - Industrial Doctorates (DN-ID)

## Ph.D. position opening (Doctorate candidate 6)

Advisor: Thibaut Divoux (CNRS / École Normale Supérieure de Lyon)

Co-advisors: John Royer (UEDIN) & Fabrice Toussaint (Holcim)

Main location: Physics Laboratory, École Normale Supérieure de Lyon & CNRS, France

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### Tuning colloidal gels by coupling shear & electric field

### Applications to gel precursors for battery electrodes

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**Context** – The Ph.D. project is part of the EU Doctoral Network “CoCoGel,” which aims to provide integrated training for young researchers in the field of Soft Matter and related Industrial Applications. The network involves leading experts in six academic and six industrial nodes and pertains to state-of-the-art expertise in experimental techniques, computer simulations, and industrial systems. The project is focused on colloidal gels that are core components in many industrial products, including building materials (e.g., cement), energy materials (e.g., batteries and fuel cells), consumer care and food products, and medicine. Recent advances in colloidal-gel physics strongly imply that the rational design of colloidal-gel properties is within reach. This design is based on tuning gel microstructure via external stimuli, such as shear, ultrasound, and (magnetic/electric) fields, and the addition of non-Brownian inclusions. CoCoGel aims to enable the translation from the current academic state of the art to industrial practice.

**Ph.D. project** – Within the European doctoral network “CoCoGel,” a Ph.D. position is available at École Normale Supérieure de Lyon in collaboration with the University of Edinburgh and Holcim to investigate in more detail the impact of electric field on the rheological properties of colloidal gels with an Electro-rheological device. Experiments will consist in determining the system response to an electric field through mechanical measurements (rheology) and structural characterization (X-ray scattering). The candidate will perform a comprehensive study of the impact of shear history on suspensions of model colloidal gels submitted to an external electric field, investigating different types of pre-shear history in the presence of a static electric field. The goal will be to find synergies between the electric field and the shear history to make gels with “on-demand microstructural properties” relevant to fabricating soft precursors involved in synthesizing solid electrolytes at [SUNLIGHT](#). The project will also explore some applications of the above concepts to building materials. In particular, the candidate will spend about one year at the [Holcim Innovation Center](#) using electric fields to control and tune the flow properties of cement pastes.

**Candidate profile** – The candidate should hold a Master’s degree in Physics, Materials Science, Mechanical Engineering, or a related field and have a good background in Soft Matter Science. Prior knowledge of rheology, and dielectric measurements will be a good asset. The candidate should not have resided in France for more than 12 months in the 36 months preceding recruitment

**Dates & remuneration** – 3 years starting in June-September 2024. Gross salary: 3000 to 3500€ per month.

**Contact** – Applications must be submitted through <https://emploi.cnrs.fr> and include a resume and a motivation letter. Please contact [thibaut.divoux@ens-lyon.fr](mailto:thibaut.divoux@ens-lyon.fr) if you need more information. Applicants should also send their application/CV to the Project manager ([cocogel@iesl.forth.gr](mailto:cocogel@iesl.forth.gr))

**Deadline for applications: 30 April 2024, Starting date: June – September 2024**