



POSTDOCTORAL POSITION at ESPCI Paris PSL (Soft Matter Science and Engineering laboratory)

Biopolymer functionalization and design for earth constructions admixtures

A postdoctoral position is available in the Soft Matter Science and Engineering laboratory at ESPCI Paris PSL. The ESPCI Paris, where the research will be performed, is located in the Paris city centre (<https://www.simm.espci.fr>). Some experiments will be conducted in Champs-sur-Marne, Navier laboratory at the Université Gustave Eiffel.

The very existence of centuries-old patrimonial earthen structures sets a proof of the durability of earthen constructions. It remains that earthen materials are sensitive to natural aggression from water. Moreover, due to climate change, buildings will be subject in the future to new and unexpected environmental conditions. For new earthen buildings, costly maintenance thus emerges as an issue limiting their acceptability. Developing repair coatings and plaster is thus key for increasing the societal acceptance of earth-based buildings. This project aims at furnishing proof-of-concept of polymer additives to formulate coatings for improving both the mechanical and water resistance of earthen constructions. The general idea is to chemically modify biosourced polymers to improve their interaction with the clay and provide them with hydrogel and hydrophobic properties.

Experimental work:

The experimental research will aim at biopolymer functionalization for the formulation of admixtures to improve the water resistance of clay. While included in a larger multidisciplinary project on earthen construction materials, this postdoc will focus on chemically modifying biosourced polymers to enhance their interaction with clays and provide them with hydrogel properties.

The bio- or biosourced polyelectrolyte will be assessed by formulating a water mix with a model swelling clay. The mix microstructure will be characterized by XRD, MAS NMR and environmental SEM. In case of success, the same formulation will be tested on a real layer of earthen building material available at NAVIER and water intake by X-ray tomography.

Qualifications and conditions of Employment

Applicants should hold a PhD degree in chemistry, physical chemistry or materials science. Ideally, the candidate will have demonstrated experience in organic and/or macromolecular synthesis and polymer functionalization, but other profiles with a good understanding of soft matter or clay science will be considered. The postdoc will bring its expertise to a research team of chemists, physicists, civil engineer and architects working on earthen constructions at different scales, implying that in addition to proven individual scientific excellence in polymer chemistry, a collaborative mindset and good communication skills (oral and written) is required. The candidate should be creative and dependable.

The position is open until filled. The intended start of the postdoc period is September 2023. The position is for 12 months (may be extended depending on funding availability). The position is funded by the ANR Project DuReTerre *Durability and Repair of Earthen Construction* and the DIM *MaTériaux avancés éco-Responsables*.

The application must be in English and include a curriculum vitae, a complete list of publications, a statement of future research plans.

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