



SUBLime

Sustainable Building Lime
Applications via Circular Economy
and Biomimetic Approaches



OPEN PhD POSITION in European Training Network

We are looking for a dedicated and highly motivated Early Stage Researcher (ESR), who will join our team to craft the future of lime mortars/plasters in new construction and conservation of the built heritage.

SUBLime description (4 years ETN project starting February 2021)

Lime is one of the earliest industrial commodities known to man and it continues to be one of the essential building blocks of modern Society. The global lime market is anticipated to approach the value of 44 Billion Euros by the end of 2026 and resulting in various growth opportunities for key players. The SUBLime network aims to develop the most advanced technology in lime-based materials modelling and characterization for industrial use that will go beyond the limitations of existing solutions in new construction and conservation in the built heritage. It is dedicated to recruit and train fifteen PhD students in multiple scientific and engineering fields towards a better understanding and development of sustainable innovations in both added functionalities and sustainability aspects in lime mortars and plasters, strongly based on novel biomimetic and closed loop recycling approaches. The cross-disciplinary approach throughout the SUBLime value chain, leveraging the knowledge of the academic (6) and industrial members (11), such as lime producers, mortar/plaster/block producers, and end-users for the prioritization of industrial needs, will dramatically increase the transfer of scientific knowledge to the lime-consuming industries in the EU.

ESR13 – UMINHO

Large scale testing & simulation - shrinkage & expansion

Objectives: The objective is to understand clearly the benefits of the developed mortars in real case applications, with a focus on shrinkage and expansion. It is well known that the shrinkage behaviour is strongly dependent on moisture states, restraint and strain capacity of the binder. An important interplay with creep is also known, bringing further complexity to the problem. Additionally, irreversible expansion is a much relevant detrimental effect on clay bricks and tiles, which depends much on moisture uptake and mortar stiffness. This activity of this ESR will be linked with all other ESRs, benefiting from the knowledge and tools developed at lower scale. The work will focus on an experimental campaign, including masonry wallets on uniaxial compression, expansion / shrinkage of masonry wallets, expansion of clay units and wall testing under restrained movement (or indirect loading). Tests on mortar shrinkage from other ESRs will be used in the analysis. After validation of the experimental results with a FEM meso-scale and a homogenized model, parametric studies will be carried out to provide estimates of natural periods for masonry buildings, behaviour factors and overstrength ratios for masonry elements and buildings, design rules masonry joints, all with the newly developed mortars.

Expected Results: Besides providing testing results for compression and shear with the new materials, which are essential to demonstrate the advantages of the new materials, validation of the simulations strategies and design rules for different applications will be proposed.

Keywords: shrinkage, expansion, mortar, masonry, numerical modelling.

Applicant Profile: Master level in Civil Engineering or related field, ideally with background in experimental and numerical research. Excellent communication skills (both written and oral) in English.

PhD main locations: The recruited ESR is given the opportunity to conduct 3 years of PhD studies at [ISISE](#) (Institute for Sustainability and Innovation in Structural Engineering) from the [University of Minho](#) but also to visit other network partners for secondments ([Danish Technological Institute](#), [Instituto Andaluz del Patrimonio Histórico](#)) and to attend the training events of the network.

Main contacts:

[Graça Vasconcelos](#), Assistant Professor, graca@civil.uminho.pt

More details about SUBLime project, requirements for the candidates and recruitment procedure: www.sublime-etn.eu/jobs/