



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.

ESR12 – SUT

Bridging from micro to macro scale on durability and long term mechanical properties including irreversible expansion

Objectives: To bridge the gap between knowledge generated at the micro and macro-scales, towards the prediction of long term behaviour of lime-based and/or modified mortars as well as masonry taken as composite material in relation to the durability, mainly characterized by in-plane deformations and crack resistance. The focus will be mainly in methods of micro and macro modelling of mortar-brick long term behaviour including shrinkage, creep and plastic deformations, prediction of changing of thermal conductivity, moisture diffusion, compressive/bending/tensile strength, bond strength, E-modulus, G-modulus and Poisson's ratio. This work will be carried out in three ways: (a) experimental tests on long-term behaviour and properties of materials; (b) fully numerical FEM models that upscale the REA's (Representative Element Area) throughout the scales, (c) analytical or semi-analytical methodology based on modification of the material properties and/or analytical calculation methods for masonry as homogenized material.

Expected Results: It is expected to produce a framework for upscaling of material properties from the micro-scale through macro-scale up to the scale of the masonry itself as well taking into consideration the long-term behaviour and durability aspects. As the results, the theoretical models are planned to be implemented in commercial software.

Keywords: long behaviour, lime, mortar, masonry, FEM modelling, scale effect.

Applicant Profile: Master level in Civil Engineering or related field, ideally with background in experimental 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 [Department of Structural Engineering](#) at the [Silesian University of Technology](#) but also to visit other network partners for secondments ([UMinho, Fels](#)), and to attend the training events of the network.

Main contacts:

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