



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.

ESR2 – TU DELFT

Experimental study and numerical simulation of the transport properties and volume stability of lime mortar at micro-scale and meso-scale

Objectives: To upscale the microstructural properties from paste level to meso-scale in mortar level to study the physical and mechanical properties of lime-based mortar, i.e., water permeability, moisture and ion transport, creep and shrinkage. More specifically, three tasks are defined: a) Simulation of the mortar structure: lime mortar is a composite material consists of bulk (lime) paste, sand and interfacial transition zone (ITZ) between lime paste and sand. The lime paste in micro-level will be upscaled by volume average method in meso-scale at mortar level. The simulated mortar structure will be used as input to simulate physical/mechanical properties mentioned above. b) Estimation the transport properties of lime-based paste and mortar: in micro-level the percolation phenomenon of microstructure of lime paste is studied and the representative elementary volume (REV) of lime paste and mortar will be determined. The simulation results will be validated using experimental results; c) Shrinkage and creep properties of lime-based paste and mortar: this task will investigate the volume stability (creep and shrinkage) of lime-based paste and mortar and to develop models for predicting shrinkage induced cracking and estimating the creep for applications in practice.

Expected Results: To produce a framework for simulating physical/mechanical properties, i.e., water permeability, moisture and ion transport, creep and shrinkage of lime-based materials. A better understand the volume stability of lime mortar is achieved.

Keywords: lime, mortar, transport properties, volume stability, numerical simulation

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

PhD main locations: The recruited ESR is given the opportunity to conduct 4 years of PhD studies at [Section Materials and Environment/Microlab](#) of the [Delft University of Technology](#) but also to visit other network partners for secondments ([TARMAC](#), [Silesian University of Technology](#)), and to attend the training events of the network.

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