Iurie Curosu – Postdoc

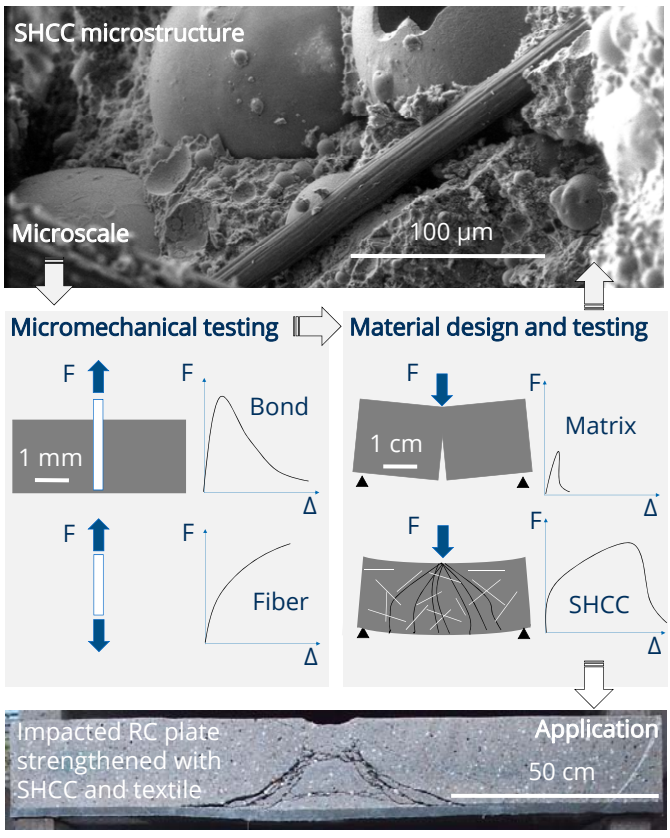
EXPERIMENTAL MULTISCALE CHARACTERIZATION AND MODEL-BASED DEVELOPMENT OF MINERAL-BONDED COMPOSITES

1 OBJECTIVES

- Experimental, analytical and numerical scale-linking involving a stochastic consideration of inherent inhomogeneities in strain-hardening cement-based composites (SHCC) with and without textile reinforcement
- Characterization of the in-situ (structural level) material behavior and correlation with the mesoscale findings
- Formulating design concepts for sustainable strengthening layers considering also the functional requirements

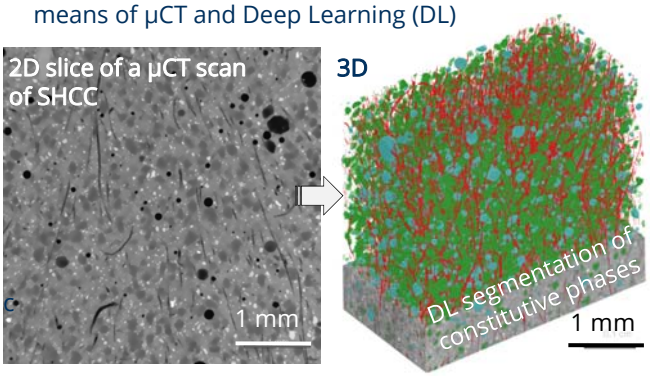
2 METHODS

- Micromechanical investigations involving various material and loading variables
- Scale-linking mechanical experiments (micro-to-macro)
- Analytical investigations on composites and on individual constituents
- Microcomputed tomography (µCT) for microstructural charaterization of fiber reinforced composites
- Artificial intelligence techniques for an automatic and detailed morphologic characterization
- Stochastic numerical models for material and structural design

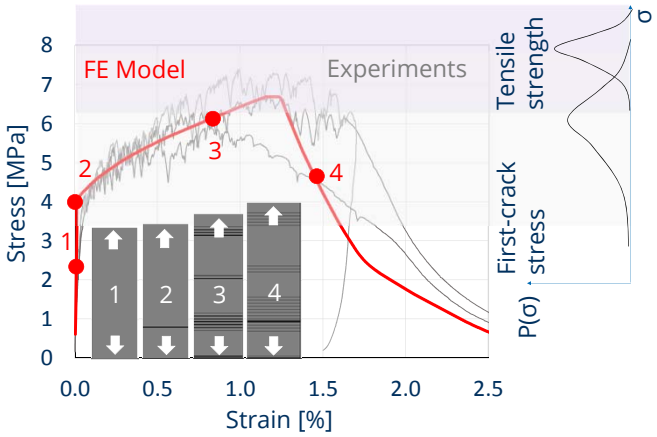


3 RESULTS

- Extensive experimental assessment of various micromechanical parameters of SHCC
- 3D microstructural segmentation and quantification by means of µCT and Deep Learning (DL)



- Statistical assessment of various material parameters and implementation in stochastic mesoscale models of SHCC and hybrid fiber reinforced composites



4 COLLABORATIONS

- D. Vo (A1/I): Strengthening performance of 3D wire structures
- E. Wölfel (A2/I): Crack-bridging behavior of PP fibers
- T. Gong (A3/I): Development and characterization of hybrid fiber reinforced composites
- A. Heravi (A4/I): Development of techniques for material testing under impact loading
- M. Hering (A5/I): Strengthening performance of SHCC with and without textile reinforcement
- E. Tamsen (B1/I): Modelling of SHCC under tensile impact loading including micro-inertia
- A. Shehni (B2/I): Modelling SHCC with discrete fibers
- F. Liebold (C1/I): tailoring and application of 3D measuring techniques for crack analysis
- Christian Steinke (B1/I assoc.): modelling SHCC with the phase field method
- etc.