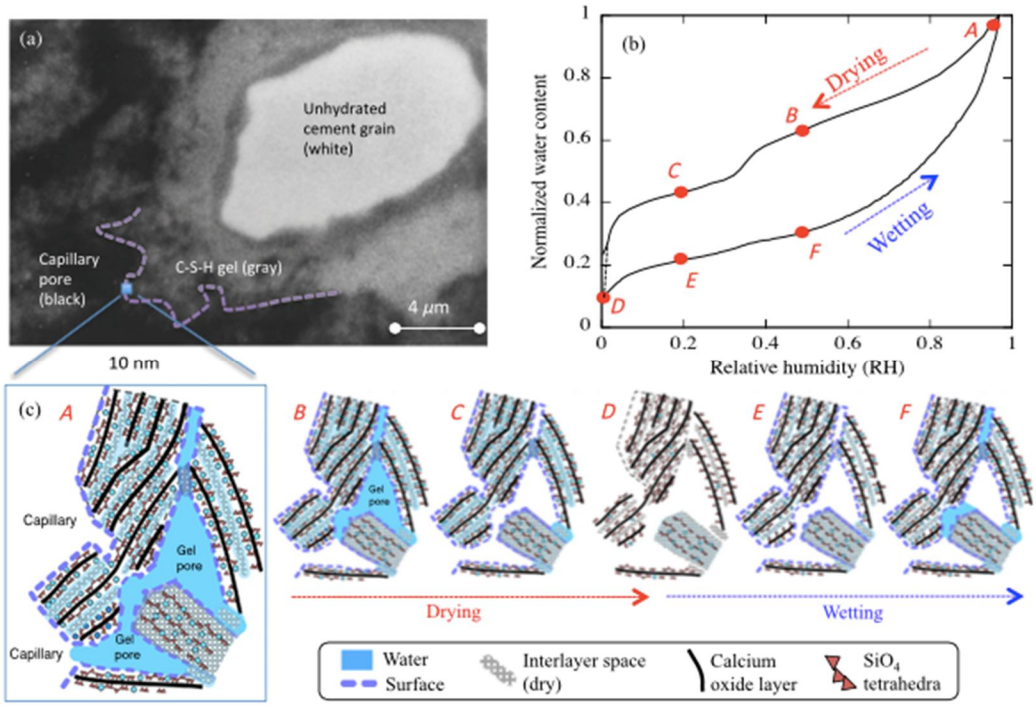
Presenter:
Enrico Masoero
Lecturer in Structural Engineering
School of Civil Engineering and Geotechnics
Newcastle University

Title:
Multiscale modelling of building materials: the nanoscale origin of shrinkage

Abstract:
The drying shrinkage of materials like concrete and geopolymers is largely controlled by micro and meso pores with size below 50 nm. Understanding the nanostructure is therefore necessary if we are ever to predict and engineer durability-related properties such as volume stability but also creep and chemical stability. In this presentation, traditional concepts like capillary and disjoining pressure in concrete will be revisited in the light of modern multiscale models and simulations, from the nanoscale up. Emerging opportunities and challenges will then be presented, in particular how simulations can help control the nano-texture development of mesoporous materials and the challenge posed by large timescales in nanoscale simulations.

Bio
Enrico was born in Asti, Italy, in 1983. He obtained a PhD in structural engineering at Politecnico di Torino, Italy, with a thesis on structural collapse. Enrico moved to MIT in 2010, where he stayed until 2013 as a postdoc working on nanoparticle models of cement hydrates. Since 2013, Enrico is Lecturer in Structural Engineering at Newcastle University, in the UK, where he conducts research on hygro-chemo-mechanical interactions in the nanostructure of cement paste. Enrico is author of 15 papers in international journals. He is member of the TU1404 COST Action on concrete durability and of the ASCE EMI Materials Properties committee. At Newcastle University, Enrico teaches Structural Mechanics, Engineering Materials, and Multiscale Modelling.



Nanoscale model of water sorption in cement hydrates, from Pinson MB, Masoero E, et al, Physical Review Applied, 2015.