



DEPARTMENT OF CIVIL ENGINEERING

DISTINGUISHED PUBLIC LECTURE (ONLINE)

Achieving high durability with new sustainable cements

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9:00 a.m. (U.K. Time)
Zoom: <https://hku.zoom.us/j/97223888219?pwd=TktYQjZ4WkjhBDZzK0RvZWplT3Fqdz09>
(Meeting ID: 972 2388 8219, Password: 575042)

Abstract

The topic of sustainability in the production of cements and concretes is gaining enormous attention at present, as global society focuses on emissions reduction. This means that researchers and practitioners are committing their efforts to ensuring that materials are produced and used in the most effective ways. Many innovations in cement chemistry are proposed to yield potential savings in environmental footprint, either by blending low-carbon constituents with Portland cement at ever-higher fractions, or by removing Portland cement entirely and using materials based on wholly different chemistry. Among these alternative cements, alkali-activated (or “geopolymer”) binders have been demonstrated in research and in practice to have very significant potential for use as a key component of a future low-carbon construction sector.

However, when discussing the use of modified or new materials in critical infrastructure applications – ranging from civil construction to the immobilization of wastes from the nuclear energy sector – the question of material durability must always be addressed. True proof of performance in a given service environment requires testing for decades or more under environmental conditions, so how can a new material ever be tested sufficiently to give confidence to engineers (and, just as importantly, regulators)? This talk will describe various approaches that are being taken to demonstrate and ensure high durability performance in high-volume blended and alkali-activated cements, looking both at the development of test methods, and the advancement of research approaches including thermodynamic modelling. The key focus for sustainable construction is on the selection and appropriate use of fit-for-purpose materials, and so the development of the evidence base to support the judgement of when a material is actually fit-for-purpose – or conversely, the circumstances in which a particular material should not be used – is essential.

About the Speaker

Professor John Provis leads the Cements@Sheffield research team at the University of Sheffield, UK. He trained in Chemical Engineering at the University of Melbourne, Australia, and relocated to Sheffield in 2012 to take up his current role within the Department of Materials Science & Engineering. He has published over 230 refereed international journal articles, supervised more than 30 PhDs, and is Editor-in-Chief of the RILEM flagship journal *Materials & Structures*, and Associate Editor of *Cement and Concrete Research*.

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