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**MATERIALS RESEARCH AND DEVELOPMENT**

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International Conference on  
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Prague, Czech Republic**K M Liew**

City University of Hong Kong, China

**Multiscale mechanics in civil engineering materials**

Because of extremely small size of micro and nano-structures, experimental studies are generally quite difficult to perform. Although experimental studies can capture certain phenomena, it is impossible to understand their delicate properties well through experimental investigations alone. In addition to a large amount of experimental work, theoretical analysis and numerical modeling play an important role in capturing the delicate behavior of complex materials systems. Theoretical and numerical approaches can be generally classified into two categories: microscale method and macroscale method. Microscale method can capture the microscale mechanism of micro- and nano-structures and yield results that are in many cases explicit in nature. However, microscale methods consume a large amount of computational resources, and thus computation is limited to

a very small size. This huge computational cost largely restricts their application. Macroscale continuum simulation can largely reduce the degrees of freedom in problems, and the theoretical and numerical analysis of large-size structures thus become possible. However, continuum simulations cannot reflect the microscale physical laws, and are not adequate. The limitations of microscale method as well as macroscale method have stimulated extensive research into multi-scale method that couples microscale method and continuum description. Multi-scale method can overcome the length and time scale limits in an efficient manner, and is emerging as a feasible and efficient approach for complex materials systems. This talk will present recent research work on multiscale mechanics and materials problems, focussing in functional materials.

**Biography**

K M Liew is currently a Chair Professor of Civil Engineering. He was the Head of Department of Architecture and Civil Engineering from 2011 to 2017 at City University of Hong Kong, a tenured Full Professor at Nanyang Technological University (Singapore), and the Founding Director of Nanyang Center for Supercomputing and Visualization. Over his academic career, he has published over 750 SCI journal articles. He is listed by the Institute for Scientific Information (ISI) as a Highly Cited Researcher in Engineering. His publications have been cited over thirty-five thousand times and his current h-index is 86. To date, He has attracted over US\$45 million research and development grants from government funding agencies, industries and higher institutions. He has graduated over 50 PhD students and supervised over 70 Post-doc fellows. His students are well received by industries and many of them have become faculty members of universities worldwide.

ca.kmliew@gmail.com