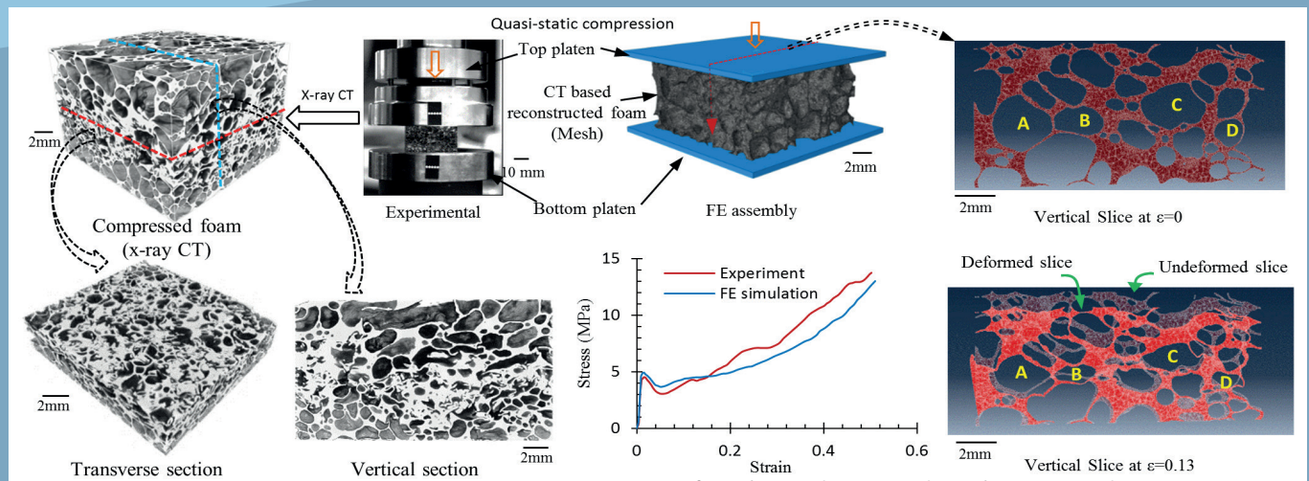
ABSTRACT: DIGITAL MATERIALS DESIGN

Digital materials design (DMD) coupled with new manufacturing techniques are emerging technologies that have the potential to revolutionize product realization on a global scale. This presentation will first outline the development of an integrated DMD workflow based on 3D multiscale imaging, analysis and modelling for geomaterials. The key aim was to "image and compute" -imaging and digitising the pore space and mineral matrix of natural rock and then numerically simulating various physical processes in this digital object to obtain macroscopic rock properties including multiphase flow, electrical conductivity, and elastic response. The presentation discusses the potential for the technology to have a much broader reach beyond the geoscience arena–touching companies and industries and giving rise to a wide range of machines, products, or services. Examples include:

- Designing innovative new customized materials and components with improved system performance.
- The development of design rules which enable the bespoke production of personalized medicines via a variety of delivery vehicles including tablets, implants and devices.
- Use of imaging, fast rendering and 3D visualization to improve surgical precision and reduce operating times in clinical settings.
- Designing improved durability of wood products and foamed materials.



Ref: Kader et al., Materials and Design, Vol 118, 11-21 (2017)

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Please be aware that the lecturer availability will be limited and not all requests can be honored by the lecturer.

THE 2019 LECTURER IS PROF. MARK KNACKSTEDT FROM AUSTRALIAN NATIONAL UNIVERSITY

BIO: Mark Knackstedt is Professor at the Department of Applied Mathematics at the Australian National University (ANU). He received his BSc degree at Columbia University and PhD in Chemical Engineering at Rice University. He has been in Australia since 1990 - primarily at ANU with a brief successful stint with a start-up company in the oil and gas sector. He has received several awards such as: George C. Matson Memorial Award from the AAPG in 2009, the ENI award for New Frontiers in Hydrocarbon Research in 2010, the 2015 Society of Petroleum Engineering Distinguished Lecturer award and several Distinguished Speaker awards from the Society of Petrophysicists and Well Log Analysts. He has been elected a Fellow of the Australian Academy of Technological Sciences and Engineering in 2012.