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ΟΜΙΛΗΤΗΣ: **Dr. Orestis L. KATSAMENIS (MSc, PhD)**
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ΘΕΜΑ: **Volume imaging by means of X-ray microfocus Computed Tomography (μCT) at the University of Southampton: From materials engineering to clinical imaging**

ΗΜΕΡΟΜΗΝΙΑ: **Δευτέρα, 8 Φεβρουαρίου 2021**

ΩΡΑ: **12:00**

Link: *Πατήστε εδώ*

ΠΕΡΙΛΗΨΗ

X-ray microcomputed tomography (μCT) or microfocus computed tomography is a non-destructive 3D (volume) imaging technique conceptually equivalent to medical CT, where hardware characteristics and arrangements are optimised for high spatial resolution (in the order of 1 to 100 μm). It is routinely used for imaging material and tissue samples ex vivo and in situ, with common sample dimensions in the order of millimeters to centimeters. The technique was initially developed and optimised to image mineralised bone structures at a microscopic level, and since then μCT is used routinely in many fields, including archaeology, biomedical research, engineering, materials science, and paleontology. The non-destructive high-resolution volume imaging capabilities of μCT render it ideal for a wide range of characterisation studies, including

volumetric inspection of the structure and geometry, inspection of structural integrity by means of defect analysis, quality control of fabrication processes (e.g. 3D printing), in situ imaging during mechanical testing, etc.

The μ-VIS X-Ray Imaging Centre at the University of Southampton is a dedicated facility for μCT and a founding partner of the recently launched UK's National Research Facility for lab-based X-ray Computed Tomography (NXCT). It combines state-of-the-art equipment and 20 years of experience, plus the expertise of over 40 academic staff from across the university. The centre constitutes a strategic multimillion pound investment (>£5M) in high resolution X-Ray tomographic imaging, offering a unique user experience for advanced 3D imaging. We specifically aim to provide a holistic approach to advanced 3D (volume) imaging, supporting all steps between original domain problem/query, through to verified, publishable conclusions.

The talk will provide a short introduction to μCT and showcase the potential of the technique to a range of research fields using representative case-studies conducted at μ-VIS. It will then present the recent development of 3D X-ray Histology (XRH), a μCT-based technique that enables non-destructive 3D (volume) visualisation of standard formalin-fixed, paraffin-embedded (FFPE) biopsy specimens for histology applications. 3D XRH was developed at the University of Southamtpon and is an umbrella term covering hardware developments, acquisition-, processing- and data- management workflows designed to seamlessly be integrated into conventional histology workflows, for clinical and research applications.

Useful links: www.muvis.org | www.xrayhistology.org

Βιογραφικό σημείωμα

I am a materials scientist (BSc, MSc – Materials Science Dpt, University of Patras, Hellas) with a PhD in bioengineering (2012) form the University of Southampton (UoS), UK and I have >10 years of experience in biomedical imaging research. I currently hold a Senior Research Fellow post at the UoS, and since August 2013 I work as beamline-scientist at the μ-VIS X-ray Imaging Centre; a dedicated centre for micro-computed tomography (μCT) at UoS where I take a leading role in the centre's biomedical imaging projects.

I have a particular interest in μCT imaging for histology applications and have worked in this field since 2015 in close collaboration with colleagues from the Biomedical Imaging Unit at University Hospital Southampton. Specifically, in 2015 -2017 as part of a Wellcome Trust Pathfinder Award I developed novel μCT imaging protocols for lung-tissue biopsies using the world's first μCT scanner for clinical histology (Nikon Med-X prototype), which was developed by our team in collaboration with Nikon X-Tek Systems Ltd. I am currently working on the second phase of development (2019-2022; £1.14M; WellcomeTrust), focusing on hardware optimisation and clinical integration of the technique, which we have termed 3D X-ray histology. In Jan. 2020 I commissioned our new custom-designed μCT scanner optimised for 3D X-ray Histology (www.xrayhistology.org).

I have co-authored 35 peer-reviews publications in international journals (h-index: 15) including The Lancet, Am. J. Pathol., Bone and Lanqmuir, three book-chapters, and >60 conference abstracts.

I am particularly interested in 3D X-ray Histology (XRH), microfocus Computed Tomography (μCT) of biological and biogenic materials, μCT for clinical applications, Pharmaceutical technology, Bone ultra- and nanostructure and Bioengineering