Preface to ToScA 2019 and ToScA 2020 online Special Issue

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For the third time, the Journal of Microscopy publishes a special 'ToScA 2019 and 2020' issue combining selected contributions invited at the 7th annual Tomography for Scientific Advancement (ToScA) symposium (University of Southampton, 2019) and at the ToScA global online edition (2020). In line with previous editions, the meetings were attended by over 150 delegates and disseminated important advancement in the field of tomography, spanning from additive manufacturing to correlative methods to life sciences.

This issue includes 4 papers showcasing research presented at the meetings. Du Plessis (2020) reported important insights on the use of X-ray computed tomography (XCT) in qualifying laser powder bed fusion technology, aiming at advancing the metal additive manufacturing processes. Additive manufacturing using multijetting printing also employed high-resolution XCT to qualitatively and quantitatively analyse composites made of soft and hard phases, with the potential to distinguish between different materials but similar in density (Curto et al., 2021). Another advantage in the use of high-resolution XCT resulted in the development of a workflow (Figure 1) to obtain a detailed distribution of bubbles in enamel coatings of vitreous enamel steel. This was then used to generate subject-specific finite element models to investigate residual thermal stress distribution, which could ultimately improve manufacturing of such composite materials for targeted applications (Sensini et al., 2020). Moving to life sciences, Karali et al. (2020) reported on the use of in situ XCT mechanics and digital volume correlation to investigate the strain distribution and load-bearing capacity in a regenerating bone fracture of a rodent model stabilised by external fixation, contributing to the understanding of bone regenerative ability.

It is hoped these papers will provide an insight into the recent advancement in the field of tomography.

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References:

Du Plessis 2020. doi: 10.1111/jmi.12930

Curto et al., 2021. doi: 10.1111/jmi.13034

Sensini et al., 2020. doi: 10.1111/jmi.12996

Karali et al., 2020. doi: 10.1111/jmi.12937

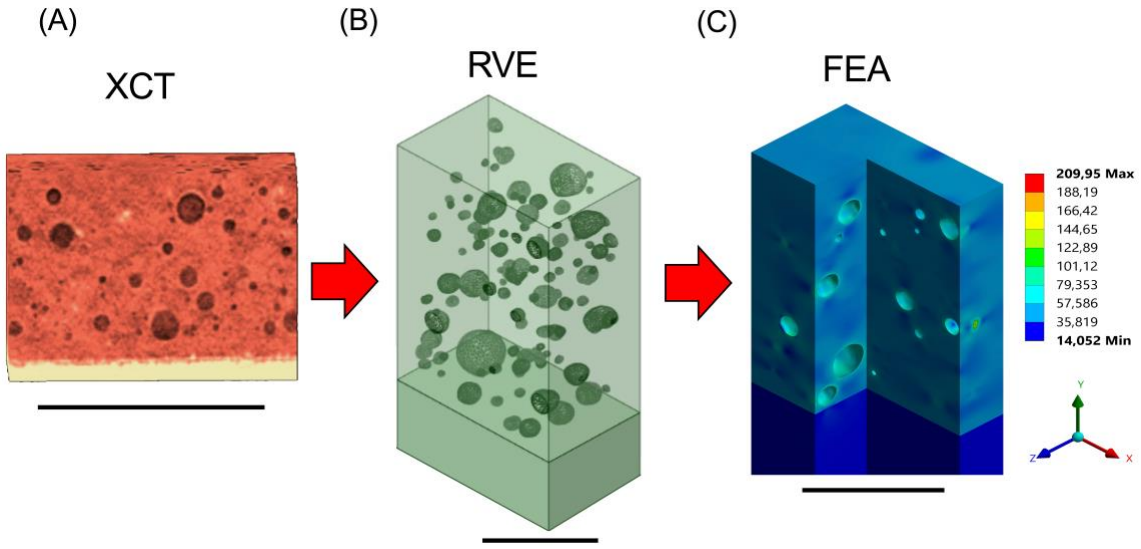

Figure 1: (A) Starting from high-resolution X-ray computed tomography (XCT) of vitreous enamel steel (VES) (scale bar = 300 μm) the (B) XCT-based representative volume element (RVE) (scale bar = 100 μm) was generated to enable (C) finite element analysis FEA of residual equivalent stress (scale bar = 100 μm) [from Sensini et al., 2020].