

# Microscopic Challenges to Understand Structural Characteristics of Protein Based Biomaterials for Research and Translational Applications in Skin Tissue Engineering



Vaibhav Sharma<sup>1</sup>, Dale Moulding<sup>3</sup>, Nupur Kohli<sup>1</sup>, Lilian Hook<sup>2</sup> and Elena García-Gareta<sup>1</sup>

<sup>1</sup>Regenerative Biomaterials Group, RAFT Institute, Mount Vernon Hospital, Northwood, HA6 2RN, United Kingdom.

<sup>2</sup>Smart Matrix Ltd, Leopold Muller Building, Mount Vernon Hospital, Northwood, HA6 2RN, United Kingdom.

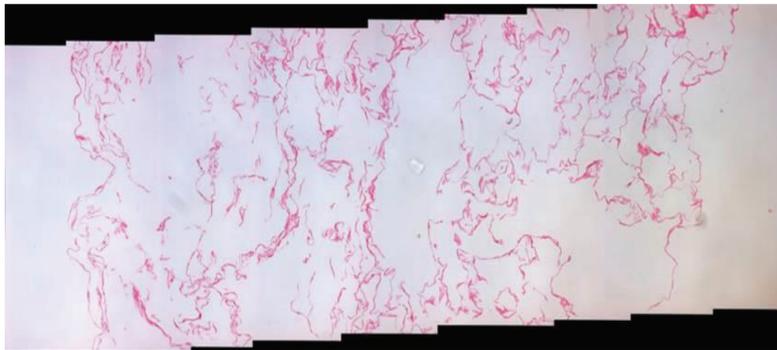
<sup>3</sup>UCL Great Ormond Street Institute of Child Health (ICH), 30 Guilford Street, London WC1N 1EH

**Introduction:** Conventional imaging technologies (histological techniques) have been used to accumulate structural information on biomaterials but have failed to provide accurate information as these techniques are invasive and can only be used on small samples. Imaging techniques should maintain the natural state of the material, should analyse large samples and allow 3D analysis.

**Aim:** To establish a suitable imaging technique for structural analysis of a 5 cm \* 5 cm fibrin-alginate scaffold

## Method & Results

Trans-sectional light microscopy sections of fibrin-alginate scaffold stained with eosin and imaged at a magnification of 10x. Fibrin strands are stained in pink and can be seen forming a network of fibres.



### Pros

- Cost Effective
- Commonly used technique

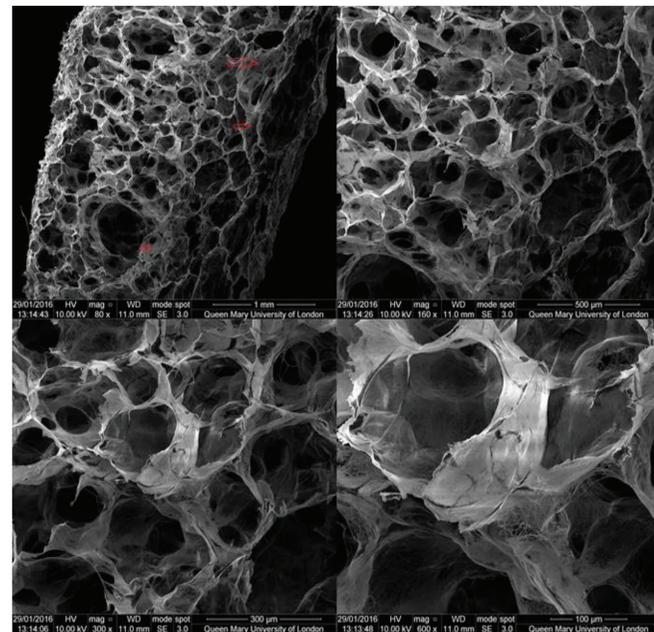
### Cons

- Changes sample properties
- Size limitation

Macroscopic representation of a 5 cm \* 5 cm piece of fibrin-alginate scaffold



Trans-sectional scanning electron microscopy micrographs of fibrin-alginate scaffold imaged at a magnification of 80 - 600x showing the fibre network and pore interconnections.



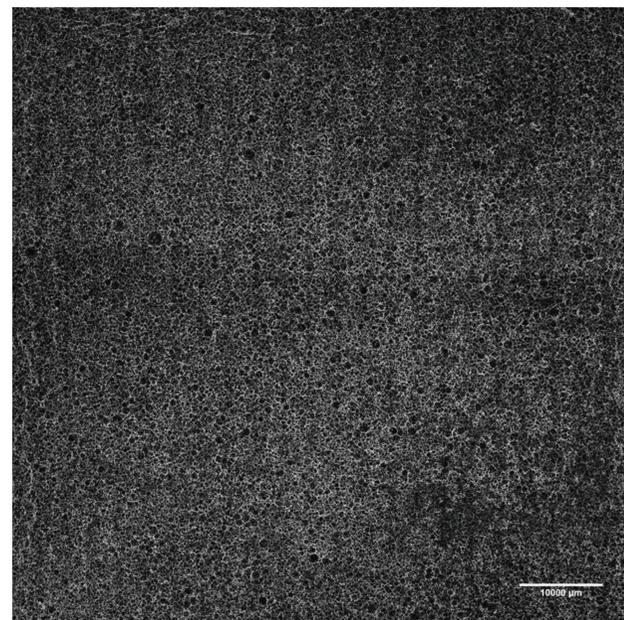
### Pros

- High resolution
- High penetration into the sample

### Cons

- Sample pre prep required
- Size limitation

Light scanning confocal microscopy (LSCM) image of a 5 cm \* 5 cm piece of fibrin-alginate scaffold showing pore distribution and pore interconnection.



### Pros

- High resolution
- No size limitation
- 3D analysis possible

### Cons

- Used with auto-fluorescent materials
- Expensive

Trans-sectional micro-computed tomography image of fibrin-alginate scaffold showing the fibre network and interconnections.



### Pros

- Use for hard tissue analysis
- 3D analysis possible
- No size limitation

### Cons

- Expensive
- Not used for soft tissue samples.

## Conclusion

- We demonstrate that the 3D imaging of a 5 cm \* 5 cm unstained soft tissue biomaterial is possible using a LSCM.
- The scanning time was faster than the conventional techniques and this method can be used as a powerful tool for biomaterial characterisation during the translational process.

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