

# **Melt Electrowriting: An Emerging Additive Biomanufacturing Technique for Soft Tissue Engineering**

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## **Abstract**

Melt electrowriting (MEW) is an emerging additive biomanufacturing technique capable of printing fibrous constructs in ultra-high resolution, bringing down the jet diameter from the micrometer to nanometer scale. Scaffolds manufactured by MEW are tailorable in terms of fibre architecture, porosity and thickness. Moreover, MEW is a solvent-free process, compatible with the use of medical grade thermoplastic polymers. These exclusive advantages make MEW an ideal manufacturing technique for the production of scaffolds for a wide range of biomedical applications. However, despite the great benefits of MEW, this technique is still at its infancy in a few laboratory set-ups. In this talk, I will give an overview of the physical principles and unique capabilities of MEW, followed by some examples on how to capitalize its potential to produce scaffolds with controlled mechanical properties for soft tissue engineering. I will cover the development of novel biomaterials capable of recapitulating the complex biomechanical features of soft tissues. Native soft tissues are characterised by a strain-stiffening behaviour that makes them very sensitive to load. Herein, the unique capabilities of MEW to produce biomimetic scaffolds with controlled non-linearity, strain-stiffening behaviour, anisotropy and viscoelasticity for soft tissue engineering will be presented.

## **Biography**

Elena De-Juan-Pardo is a Senior Lecturer at The University of Western Australia (UWA) and Laboratory Head at the Harry Perkins Institute of Medical Research. She is a materials engineer with 15 years of experience in biomaterials and biofabrication for tissue engineering, regenerative medicine and in vitro modelling. Her current research focuses on the development of melt electrowriting, a pioneering 3D printing technology that enables the production of highly controlled fibrous scaffolds with tailored mechanical properties for tissue engineering and biomedical applications. From 2008-2012 she established and led the Tissue Engineering and Biomaterials Group at the Centre of Studies and Technical Research of Gipuzkoa (Spain) and served as Director of the Master in Biomedical Engineering at the University of Navarra (Spain). In 2013 she joined the Centre in Regenerative Medicine at the Institute of Health and Biomedical Innovation of the Queensland University of Technology to further expand her interdisciplinary research skills in the areas of biomaterials, tissue engineering and biofabrication. She served as Deputy Director of the Centre for the three years prior to joining UWA.

