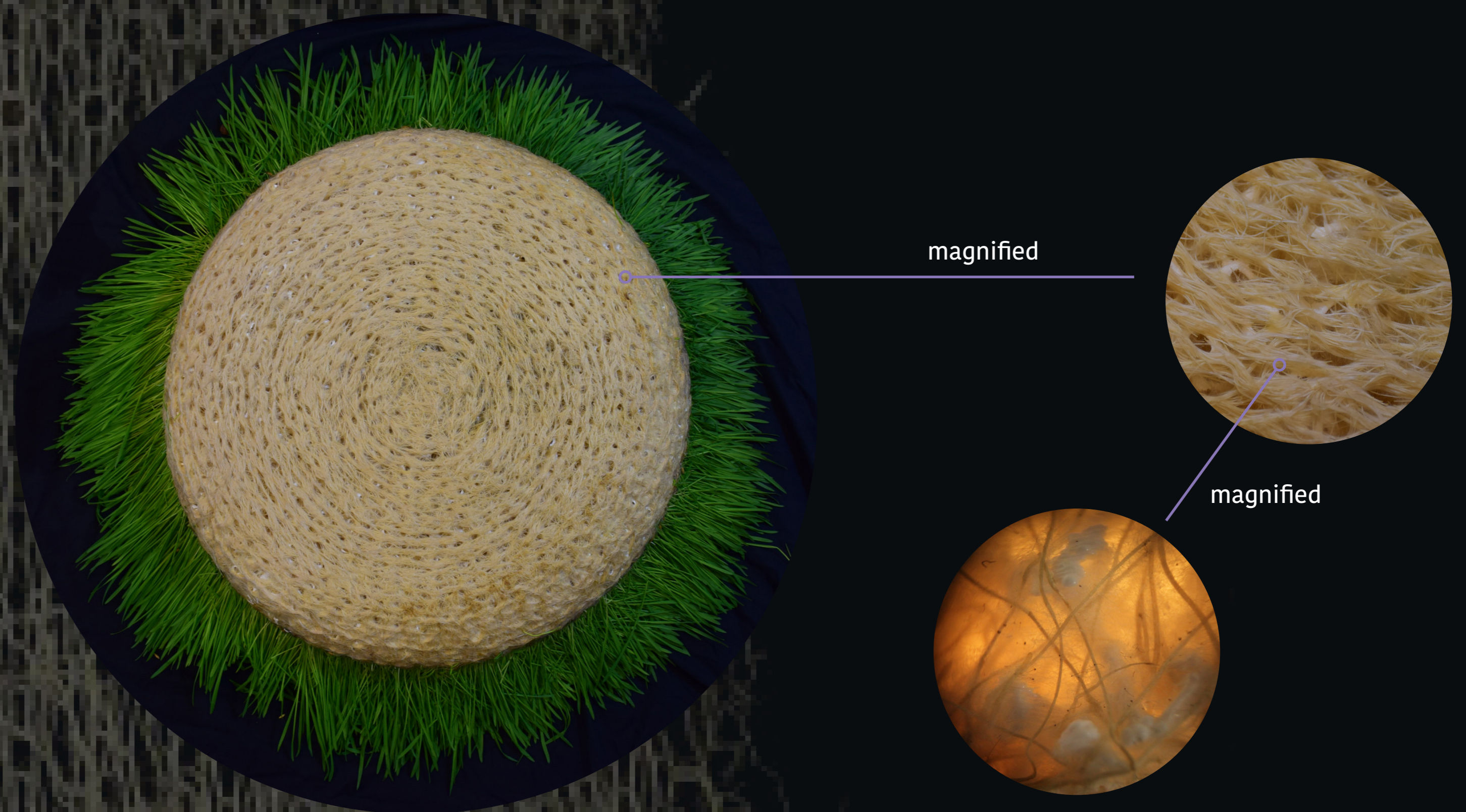
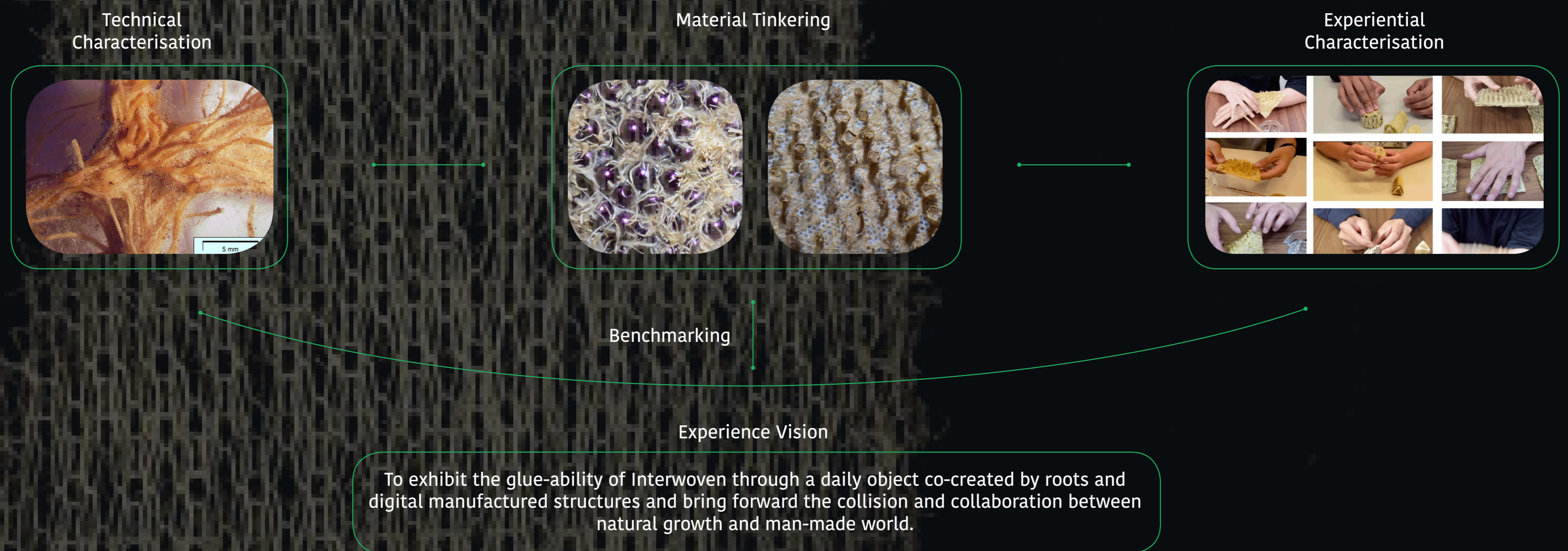


INTERWOVEN: Designing Biodigital Objects with Plant Roots

Exploring Material Structure and Experience

Material Driven Design



Interwoven is a **textile grown from plant roots**, showing the intelligence of plants. It is originally from the attempt of training plant roots to form a manmade pattern since 2015 by visual artist Diana Scherer based in Amsterdam. Due to fragility, it still remains an artistic work. However, **Interwoven has a great potential for sustainable product design if further development is made through altering the material structure**. Collaborating with Materials Experience Lab of Industrial Design Engineering in TU Delft, Diana Scherer wants to **bring an artistic material closer to people's daily life (make it more durable and applicable)**. The author, by following the Material Driven Design method (Karana et al., 2015)*, develop the material by **altering material structure** through hacking the growing process, incorporating digital fabrication techniques and the results from the user studies, with a particular emphasis on people's experience on interpretive level. Digital Fabrication techniques are used to design the structural pattern for achieving functionally graded material properties (e.g. spatially graded stiffness), and shape optimisation.

Based on Diana Scherer's experience and early experiments, a few techniques are synthesized and developed in the tinkering with Interwoven. **Some potential structures for digital biofabrication are: [1] root growth can be manipulated to mirror digitally generated patterns, which would provide intended technical and experiential characteristics in Interwoven; [2] roots grown in agar gel change properties to stiffer and stronger by hand feeling (further mechanical tests are needed); [3] roots can sew through discrete obstacles in their growing direction and these obstacles can be designed with digital fabrication techniques.**

Combining the insights and experiential studies, a material concept has been created: **showing roots glue-ability to porous materials to form a strong structure and growing traces to blend nature and man-made world**. The final product concept is to imitate one of the most mass-produced daily products - IKEA ALSEDA, questioning the current way of manufacturing and material use. The co-creation structure increased durability of Interwoven.

Jiwei Zhou
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Committee Elvin Karana
Jun Wu
Company Diana Scherer, Interwoven

**TU Delft**