

# BACTERIAL CELLULOSE: HYBRID GROWTH COMPOSITE WITH TEXTILE SUPPORTS MATERIALS FOR SUSTAINABLE ARCHITECTONICAL DESIGN

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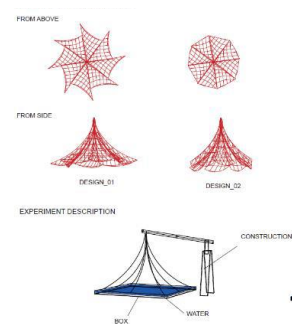
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## Abstract:

The global crisis is manifesting itself in many areas of human endeavour. One of the real problems is that natural resources are diminishing or being used inefficiently. Building materials are running out and the production of building materials is ecologically demanding [1]. In this work, we are concerned with the development of a material and its moulding that is produced by a natural fermentation process and can substitute its properties for soft plastic building composites, which have a high carbon footprint as part of their life cycle. The material under investigation has a carbon footprint 95% lower than synthetic versions of the composite with similar properties and does not require machinery to produce it. The project outlines the possibility of improving the quality of life in the future, not only in urban architecture, by using eco-friendly materials that have good functional properties, are reproducible and environmentally friendly to produce.

The project deals with growing materials based on bacterial growth by research by design. The central material investigated is bacterial cellulose. This material is included in the research area, "bio-living architecture". The development seeks to find alternatives to synthetic composites and to replace them with natural materials, thus defining new tiers and forms that this material offers. This material, prepared in a nutrient solution, will be mixed with textile fibres and nonwoven fabrics materials, particles to create a range of patterns with different properties and shapes that can be further developed by architecture. The project is complemented by the design of an architectural solution in collaboration with an architect.

**Keywords:** bacterial cellulose, composite, hybrid growth, textile supports



**Figure 1.** Example of composite with bacterial cellulose, architectonical shape used on growing composite level.

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## REFERENCES

- [1] M. Ul-Islam, M.W. Ullah, S. Khan, J.K. Park, Production of bacterial cellulose from alternative cheap and waste resources: A step for cost reduction with positive environmental aspects, Korean J. Chem. Eng. 37 (2020) 925–937.