Seeking a chemical contract manufacturing partner to scale up and produce at 1000L-scale of metal-cellulose hybrid fibers

Summary

Profile type

Technology request

Company's country

Switzerland

POD reference

TRCH20251216001

Profile status

PUBLISHED

Type of partnership

Commercial agreement with technical assistance

Research and development cooperation agreement

Targeted countries

- **Bulgaria**
- **Estonia**
- **Poland**
- **Luxembourg**
- **Hungary**
- **Finland**
- **France**
- **Lithuania**
- **Cyprus**
- **Slovenia**
- **Slovakia**
- **Croatia**
- **Ireland**
- **Sweden**
- **Spain**
- **Switzerland**
- **Austria**
- **Latvia**
- **Netherlands**
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- **Portugal**
- **Denmark**
- **Germany**

- **Italy**
- **Malta**
- **Czechia**
- **Greece**
- **United Kingdom**

Contact Person	Term of validity	Last update
Enrico FRANZIN	**16 Dec 2025** **16 Dec 2026**	**16 Dec 2025**

General Information

Short summary

A Swiss start-up synthesized metal-cellulose hybrid fibers, used to develop energy-efficient, electrical resistance heating mats for the automotive industry.

To scale the paper manufacturing and customization to pilot plant level, the company seeks a chemical contract manufacturer to produce its novel material at 1000L-scale.

Full description

The company is a Swiss start-up in the materials sector and operates since 2023. It specializes in the synthesis of unique metal-cellulose hybrid fibers. Those can be used for a vast number of applications, one of them being electrical resistance heating. The company focuses on developing their novel heating technology for machine part heating and mobility, and automotive market.

In addition, the company is exploring the applicability of their metal-cellulose hybrid fibers in electromagnetic shielding. There, their fibers are compounded with polymers for possible applications in extruded cable shielding jackets or injection molded shielding housings. They could already show the basic manufacturability of their material.

Technology and Development:
The technology is based on the company's patent-pending material & synthesis process: natural cellulose fibers are introduced into a wet-chemical synthesis in which metal particles are grown into or onto those fibers. The fibers can stem from any natural source and may be of any length, typically ranging from 0.6 to 2.2 mm mean length. The synthesis takes place in an organic solvent, and the copper source is an organic salt, which is added in powder form.
The synthesis allows for tailoring the location and amount of metal particles, therefore also electrical conductivity. For the heating application, those fibers are then further processed into electrically conductive paper and customized with electrodes and packaging to form a heating element, ready for integration.

The company has in-house expertise and resources for doing all the mentioned manufacturing in laboratory scale up to 5L volume. In the long run, the company plans to outsource the material synthesis step.

Partnership:
For the next step in further developing the company's heating elements, they need to scale the paper manufacturing and customization to pilot plant level. This requires a fiber supply on the kilogram-scale and beyond. In the shielding case, the same holds true. For this scale of synthesis output, the company does not have the infrastructure for, marking the time to start outsourcing their fiber synthesis.

The company seeks a partner which is ideally capable of producing the whole range of metal-cellulose fibers. They envision a close collaboration, first starting with an initial pilot phase where the feasibility of further scaling their lab-proven synthesis to a kg-scale is shown, ensuring product quality and specifications, in the frame of a commercial agreement with technical assistance or R&D collaboration.

After successful completion, further scaling steps shall be performed with interest to continue for a longer-term partnership.

Advantages and innovations

The company's heating technology poses several advantages over conventional, mainly wire-based heating:

- Easier shape customizability and integration: the heating mats can be cut like paper and thus customized to almost any shape, even after manufacturing.
- 2D heating: the company's heating technology enables areal heating by design, eliminating the need for a heat-spreading upholstery like it is the case with wires. Therefore, their solution can save up to 30% of energy.
- Weight & size: their heating elements are very thin (<0.5 mm) and light (< 400 g/m2), compared to conventional solutions.

In addition, possible advantages of the company's metal-cellulose hybrid material in electromagnetic shielding are:
- Lighter and more durable cable shielding jacked compared to standard braided metal wire jackets
- Faster processing in co-extrusion

Technical specification or expertise sought

The company is seeking a contract manufacturer to outsource the production of its novel material. The ideal partner would offer custom chemical synthesis services on pilot/ commercial scale, while securely handling intellectual property.

The material doesn't require optimization on R&D scale and has been successfully scaled up to 5L in-house. What is still required is the know-how of experienced chemical manufacturers to upscale and produce the material in large volumes. More specifically, the collaboration partner should provide 100L-1000L capacities. The company's needs include:

- For application 1: an output of 200kg per year for 2 years at least. This equals roughly 8 runs of 1000L per year.
- For application 2: an output of 30kg until summer 2026. This equals roughly 1 run of 400L.

After the completion of the upscaling efforts and the production of the above-mentioned quantities, the company would be interested in a long-term collaboration for commercial production.

The production of the metal-cellulose hybrid fibers consists of the wet chemical synthesis and the post processing of the fibers. The multi-addition synthesis involves cellulose fibers, a metal salt in powder form and an organic solvent. The reaction occurs in the range of 140-180°C. The post processing of the fibers involves a washing step with an organic solvent and a size separation method, to remove undesired byproducts.

The presence of fibers in the reaction introduces operational and handling challenges. For instance, mixing in large vessels to ensure successful heat and mass transfer will likely require special consideration. Another technical challenge is the (un)loading of the fibers from the reactor which is conducted manually in house.
The product's quality can be assessed optically, chemically and gravimetrically and could also be done by the company if the partner lacks this equipment.

Regarding the cost of the service, the company targets a price at pilot scale production (200 kg/y) on the order of 100 €/kg. The company is aware of the additional costs the initial familiarization and scale-up trials require.

Stage of development

Available for demonstration

Sustainable Development goals

- **Goal 9: Industry, Innovation and Infrastructure**
- **Goal 12: Responsible Consumption and Production**
- **Goal 13: Climate Action**

IPR Status

IPR Notes

Partner Sought

Expected role of the partner

The company expects a partner to familiarize themselves with the provided synthesis recipes, then perform and validate scaling to suitable large reaction vessels over 1 or 2 steps. This includes raw material handling, preparation, product extraction and post-processing. The steps shall be chosen according to economical criteria and suitable product amount to enable pilot or small-series production in the further manufacturing chain of the company. Throughout, the company values close collaboration and exchange to ensure product quality and specifications. Ideally, this collaboration leads to a longer-term partnership with recurring orders.

The specific area of activity of the partner:

The partner should have experience in custom chemical synthesis contract manufacturing tailored to the company's requirements:
- Wet chemical synthesis of metal–cellulose hybrid fibers
- Reaction temperature: 140–180°C
- Post-processing includes solvent washing and size separation to remove byproducts

Their expertise should cover process development up to pilot and commercial scale.

Type of partnership

Commercial agreement with technical assistance
Research and development cooperation agreement

Type and size of the partner

- **SME <=10**
- **R&D Institution**
- **Big company**
- **SME 50 - 249**

Dissemination

Technology keywords

- **02007020 - Biobased materials**
- **02007022 - Conductive materials**
- **03004010 - Special chemicals, intermediates**
- **02007018 - Advanced Textile Materials**

Market keywords

- **09004003 - Textiles (synthetic and natural)**
- **07004001 - Clothing, shoes and accessories (including jewellery)**
- **07001007 - Other leisure and recreational products and services**
- **09001005 - Motor vehicles, transportation equipment and parts**

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- **Italy**

Sector groups involved

- **Energy-Intensive Industries - BioChemTech**
- **Energy-Intensive Industries - Materials**

- **Malta**
- **Czechia**
- **Greece**
- **United Kingdom**