



# **DIRECTORY OF CELLULOSE NANOMATERIALS 2024**

**Biobased Markets  
May 2024**



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Sappi Valida is a leading producer of fibrillated cellulose with naturally derived functionality for a wide range of applications including personal care, agriculture, coatings, construction additives and packaging. Sappi Valida is available in commercial volumes from a number of production facilities.

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May 15, 2024

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## **On the Cover**

Thanks to Nathalie Lavoine, Assistant Professor, North Carolina State University for the polarized light microscopy photo of a film of cellulose nanocrystals.

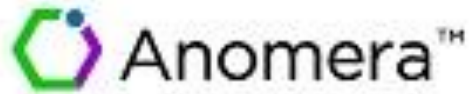
The Lavoine Group in the Department of Forest Biomaterials, College of Natural Resources, investigates the structure-processing-properties relationships of renewable nanomaterials derived from biomass with the goal of proposing sustainable alternatives to certain fossil-fuel-derived products.

Cellulose nanocrystals are nanoscale building blocks of the biomass that have the ability to self-assemble in a chiral nematic structure. Through control of their assembly, films of CNCs can mimic the pageantry of colors found in nature. These colors are a source of inspiration for art and science. For example, the brilliant blue color of Morpho butterflies has long held the interest of artists and scientists.

Exploiting the trees at a nanoscale regime to reproduce the structural colors in nature is a greener alternative to traditional coloration and patterning techniques that positively impacts our environment.

*Thank you to our sponsors*

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# Introduction

## About The Directory of Cellulose Nanomaterials

Following the update of the TAPPI Nano Production Summary (<https://www.tappinano.org/whats-up/production-summary/>), Biobased Markets, TAPPI, and TAPPI's Nanotechnology Division agreed that it would be good for the industry for Biobased Markets to publish *The Directory of Cellulose Nanomaterials*.

It was agreed that *The Directory* should be free, and listings should also be free, and that *The Directory* should be funded entirely through advertising. TAPPI Publications and the TAPPI Nanotechnology Division will help distribute it, and Biobased Markets will pursue other channels as well to get the broadest possible circulation and maximum exposure for the organizations listed in *The Directory*.

We believe *The Directory* is the world's most complete global listing of producers of nanocellulose, providers of technology related to nanocellulose, and service providers, research organizations and universities working with nanocellulose. Companies and other organizations who wish to be included in any future issues of *The Directory* should contact Biobased Markets.

Feel free to distribute *The Directory* yourself, in its entirety, as you see fit.



## About Biobased Markets

Market-Intell LLC was founded in 2005 by Jack Miller to provide market intelligence in paper, print, and re-branded as Biobased Markets in 2018. Biobased Markets is now focused primarily on biobased materials, especially nanocellulose and lignin.

Market-Intell LLC and Biobased Markets have collaborated with organizations such as TAPPI, Fastmarkets RISI, and Biofuels Digest, as well as a number of independent associate consultants, universities, and research organizations. Services include business development, lead development, market research, support for due diligence for potential investors, and custom Webinars to provide education about lignin and nanocellulose applications and markets.

Market-Intell and Biobased Markets have served clients in North America, South America, Europe, and Asia.

Since 2005, Jack Miller has been Principal Consultant, Market-Intell LLC. Jack has served as an Associate Consultant with RISI and a member of the Advisory Board of Sweetwater Energy, a biorefinery company. Jack was Business Development Consultant with CelluForce, Inc., from 2011 to 2013, and was Consulting Manager, Global Nanocellulose Sales, American Process, Inc. (now GranBio), in 2014 and 2015. Prior to 2005 Jack enjoyed a long career in the pulp and paper industry.

Jack is the author of:

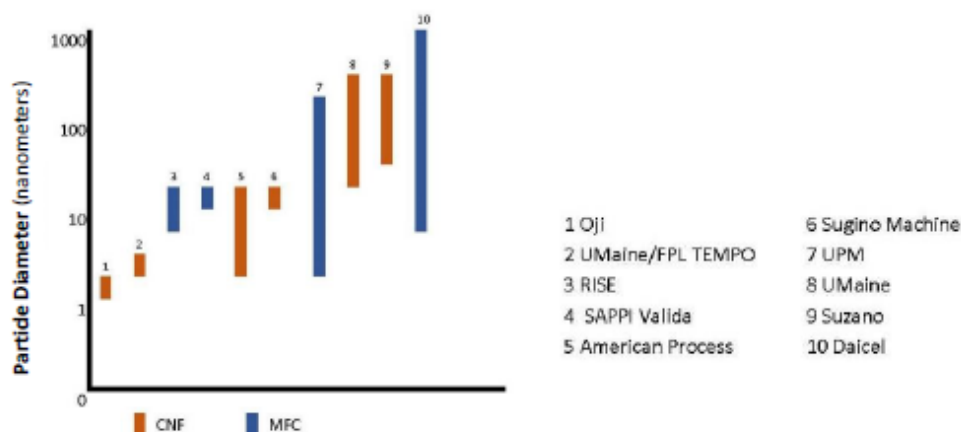
- TAPPI Cellulose Nanomaterials Production Summary, TAPPI, May 2024
- *The Directory of Cellulose Nanomaterials*, Biobased Markets, May, 2023
- *Lignin 2021: A Pivotal Year*, published by Biofuels Digest in March 2021
- *Nanocellulose: Packaging Applications and Markets* published by RISI in 2019
- *Nanocellulose Challenges and Opportunities: End User Perspectives*, published by TAPPI in 2018
- *Lignin: Technology, Applications, and Markets* published by RISI in 2017
- *Nanocellulose Producers, Products and Applications, A Guide for End Users*, published by TAPPI in 2017
- *Nanocellulose: Technology, Applications and Markets*, published by RISI in 2014.

## Overview of Cellulose Nanomaterials

It is well known that the distinction between microfibrillated cellulose or cellulose microfibrils (MFC), and nanofibrillated cellulose or cellulose nanofibrils (CNF) is not clear cut. Some materials called CNF are primarily micro-scale while some called MFC are primarily nano-scale, and some are a mix of nano- and micro-scale particles (Figure 1).

Further, the distinction between MFC and “highly refined pulp” is also not clear cut. By some estimates, more than 75% of all “nanocellulose” is MFC, produced on site by mills and used in their own pulp, paper, and paperboard production, but much of this is in fact highly refined pulp. This Summary does not include “highly refined pulp” but does include what producers have reported as MFC. In this Summary, we use the terminology the producer uses. If nano or micro are not specified, the material is included under MFC.

**Figure 1**  
**CNF and MFC Particle Diameters**



Source: *Nanocellulose: Producers, Products, and Applications, A Guide for End Users*, TAPPI, 2017

It has also become apparent that the difference between CNF and CNC (cellulose nanocrystals) is becoming blurred. CNC was originally produced primarily from bleached pulp by means of sulfuric acid hydrolysis, which essentially separates the crystalline portion of cellulose from the non-crystalline or amorphous portion. CNF was produced by primarily mechanical means, in some cases with enzymatic or chemical pretreatment to reduce energy cost. CNF and CNC were very different, and the difference was quite clear.

Now, however, biorefinery processes have emerged that produce CNF or CNC from biomass. GranBio (American Process) uses sulfur dioxide and ethanol (AVAP® Process) to fractionate biomass into lignin, hemicellulose and cellulose, and can produce either CNC or CNF, or a blend of the two.<sup>1</sup> More recently, Sweetwater Energy introduced its Sunburst™ reactive extrusion process, a technology acquired by

<sup>1</sup> Miller, J. *Nanocellulose Producers, Products and Applications, A Guide for End Users*, TAPPI, 2017.

Fibenol in 2023. The Sunburst process also fractionates biomass into lignin, hemicellulose and cellulose, and with further enzymatic hydrolysis can yield MCC, CNC or CNF.<sup>2</sup>

CNC and CNF cannot be definitively distinguished solely by particle size, crystallinity, or other metrics, though cellulose nanofibrils tend to be longer, and may be entangled, while nanocrystals tend to be more crystalline and can be presented as discrete particles.<sup>3</sup> Work continues at TAPPI and ISO on standards, nomenclature, and characterization.

A more detailed discussion is beyond the scope here.

---

<sup>2</sup> Miller J. *Lignin 2021: A Pivotal Year*, BioFuels Digest, 2021.

<sup>3</sup> <https://www.iso.org/obp/ui/en/#iso:std:iso:ts:20477:ed-2:v1:en>



# Production Summary

## Cellulose Nanocrystals (CNCs)

### Recent Updates

In 2023 **Fibenol OÜ** acquired the Sunburst™ reactive extrusion process from Sweetwater Energy. The process deconstructs biomass into lignin, hemicellulose and cellulose in 20 seconds, and with further enzymatic hydrolysis can yield low-cost MCC, CNC, or CNF. Fibenol provides three different grades of MCC as aggregated CNC or CNF. The three grades differ in lignin content: crude MCC (25-30% of lignin), blonde MCC (5-10% of lignin), white MCC (less than 5%). Fibenol CNC is disaggregated MCC. Fibenol has the capability to produce 10 tons of each grade of CNC paste, 20 wt%, 30 tons total, 6 tons dry basis.

**Nordic Bioproducts Group (NBG)** is a Finnish producer of microcrystalline cellulose (MCC) at a capacity of 10,000 tonnes/year. NBG converts MCC into carboxylated cellulose nanomaterials at a pilot scale.

### CNC Capacity 2024 (tonnes per year, dry basis)

Producer	Process	Capacity
CelluForce, Canada	sulfuric acid hydrolysis	300
Anomera, Canada	carboxylated	170
GranBio, U.S.	SO <sub>2</sub> fractionation	130
Navitas, Slovenia	proprietary	50
Melodea, Sweden	sulfuric acid hydrolysis	35
Fibenol, Estonia	reactive extrusion	6
Forest Products Lab, U.S.	sulfuric acid hydrolysis	3
Blue Goose Biorefineries, Canada	metal catalyzed oxidation	2
Innotech Alberta	sulfuric acid hydrolysis	1
Cellulose Lab, Canada	various	<1
FPIInnovations, Canada	sulfuric acid hydrolysis	pilot
Hangzhou Yeuha Technology Co., China	proprietary	pilot
Nordic Bioproducts Group	from MCC	pilot
Tianjin Haojia Cellulose Co. Ltd., China	modified and unmodified	pilot

## Cellulose Nanofibrils (CNF) and Microfibrillated Cellulose (MFC)

### Recent Updates

**ITENE**, Spain's Instituto Tecnológico del Embalaje, Transporte y Logística is a new addition to our list of CNC producers. ITENE operates a pilot plant for the production of produce MFC from different sources (agricultural wastes, recycled fibres, food wastes, annual plants or common trees). MFC production is 50kg/day of aqueous suspensions (up to 3 wt%). ITENE can also produce other cellulose nanoadditives (CNC and CNF) and can be functionalized for target applications such as barrier coatings for flexible packaging or reinforcements for biocomposites.

In 2023, **KCL** of Finland acquired Betulium Oy, a producer of MFC from industrial side streams such as sugar beet pulp.

**Norske Skog** installed their MFC pilot plant at Saugbrugs in 2017 with an announced capacity of 365 tonnes of CEBINA™ MFC and in 2023 upgraded its capacity to 526 tonnes.

**Re-Fresh Global** is a biotech company with a patented process that converts textile waste into nanocellulose materials called **Re-Nano™** microfibrillated cellulose. Re-Fresh Global offers a range of valuable resources for over 14 industries, including Re-SanPulp, a customizable textile pulp made from recycled synthetic fibers, and Re-Thanol, a bio-ethanol with diverse industrial applications.

**Sappi** reports that as of Q1 2023, Valida CNF is available in larger volumes as production capacity has expanded beyond the pilot plant in the Netherlands. In 2020 Sappi launched its diverse Valida natural cellulose products for a wide range of applications including personal care, coatings, construction additives and packaging.

In early 2023, **Suzano** started up "the world's first industrial-scale MFC production unit" in Limeira, SP, Brazil with capacity of 20,000 tpy (dry basis). Suzano also operates a 700 tpy (dry basis) pilot plant. Also in 2023, **Woodspin**, a joint venture between Suzano and Spinnova started operations with the capacity to produce 1,000 tpy of MFC made from eucalyptus pulp. With Woodspin, Suzano produces MFC on site in Finland for use in Spinnova textiles.

**Weidmann Fiber Technology** MFC capacity is updated to 150 tpy. Weidmann produces Celova® microfibrillated celluloses and cellulose powder with a purely mechanical process that uses no chemical or enzymatic pretreatment. Raw materials include pulp and perennial plants.

**CNF Capacity 2024**  
(tonnes per year, dry basis)

<b>Producer</b>	<b>Process</b>	<b>Capacity</b>
Sappi Biotech, Global	proprietary	650
Nippon Paper, Japan	TEMPO, carboxylated	560
University of Maine, U.S.	mechanical	260
GranBio, U.S.	SO <sub>2</sub> fractionation	130
CelluComp, UK	chemical pretreatment	100
Oji Paper, Japan	phosphate esterification	40
Chuetsu Pulp and Paper, Japan	aqueous counter collision	30
Sugino Machine, Japan	oblique collision	26
Seiko PMC, Japan	modified hydrophobic	24
Cellulose Lab, Canada	TEMPO, other	18
Tianjin Haojia Cellulose Co., Ltd, China	TEMPO, carboxylated	3
Dai-ichi Kogyo (DKS), Japan	TEMPO	1
U.S. Forest Products Lab, U.S.	TEMPO, mechanical	<1
ITENE, Spain	mechanical	pilot
Re-Fresh Global, Germany	enzymatic treatment	pilot
VTT, Finland	chemical, enzymatic, mechanical	pilot

**MFC Capacity 2024**  
(tonnes per year, dry basis)

<b>Producer</b>	<b>Process</b>	<b>Capacity</b>
Suzano, Brazil	mechanical	20,000
FiberLean Technologies, UK	mechanical w. minerals	13,000
Sappi Biotech, Global	proprietary	6,220
Borregaard, Norway	proprietary	1,000
Woodspin, Finland	mechanical	1,000
Norske Skog, Norway	mechanical	526
Klabin, Brazil	mechanical	350
RISE, transportable container factory	enzymatic pretreatment	200
Daicel, Japan	high pressure homogenizer	200
Weidmann Fiber Technology, Switzerland	mechanical	150
CTP/FCBA, France	enzymatic pretreatment	25
RISE, Sweden	enzymatic pretreatment	25
Stora Enso, Finland	n/a	N/A
Empa, Switzerland	enzymatic pretreatment	pilot
InoFib, France	chemical pretreatment	pilot
ITENE, Spain	mechanical	pilot
KCL, Finland	n/a	pilot
Re-Fresh Global, Germany	enzymatic treatment	pilot
UPM, Finland	n/a	pilot



## Cellulose Filaments (CFs)

### Recent Updates

Cellulose filaments are a variant of MFC or CNF in which long, thin filaments are produced from pulp “by peeling the filaments from wood fibers using a mechanical process that uses no chemicals or enzymes.”<sup>4</sup> Cellulose filaments have a greater aspect ratio than MFC or CNF, i.e., 1,000 or more, with width of 80 to 300 nm.

Cellulose filaments were developed by **FPInnovations** and were first commercialized by **Kruger Inc.** under the brand name FiloCell™.

In February, 2020 **Performance BioFilaments**, a 50/50 joint venture between Mercer International, Inc. and Resolute Forest Products announced the availability of high-performance CNF beginning in 2021 with a 21 tpd plant at Resolute’s Kénogami paper mill in Quebec, Canada.<sup>5</sup>

**Tianjin Haojia Cellulose Co., Ltd.**, established in July 2013, is also reported to be producing cellulose filaments in the Tianjin Key Laboratory of Pulp and Paper, Tianjin University of Science & Technology.

### Cellulose Filaments Capacity 2022 (tonnes per year, dry basis)

Producer		Capacity
Performance BioFilaments, Canada	mechanical	7,000
Kruger, Canada	mechanical	6,000
Tianjin Haojia Cellulose, China	n/a	n/a

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<sup>4</sup> <https://fpinnovations.ca/media/factsheets/Documents/cellulose-filaments.pdf>

<sup>5</sup> Performance BioFilaments press release Feb 10, 2020. <https://www.performancebiofilaments.com/en/news-and-media>

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# Producers of Cellulose Nanomaterials

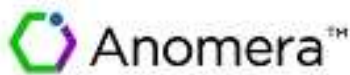
At Pilot Scale or Larger

## Alberta Innovates (Canada)

See Innotech Alberta

## American Process (U.S.)

See GranBio



## Anomera (Canada)

805-460, rue Sainte-Catherine Ouest  
Montreal, Québec, Canada H3B 1A7  
514 845 4444

<https://www.anomera.ca/>

Anomera Inc. manufactures carboxylated Cellulose Nanocrystals (CNC) in a patented eco-friendly method that delivers a high-performance nanomaterial. This platform product uses renewable raw materials sustainability harvested from Canadian forests to create a low energy, biodegradable alternative for formulating plastic free products in both industrial and cosmetic applications. Its pilot plant and R&D lab is based in Montreal, Quebec and its manufacturing facilities is located in Temiscaming Quebec. To request a sample or purchase a cosmetic product, contact Anomera's distributor [Croda](#). For industrial applications, please contact Anomera directly.

Contact:

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## **Asahi Kasei (Japan)**

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Tokyo 100-0006 Japan  
<https://www.asahi-kasei.com/>

Asahi Kasei is a leading global producer of fiber products, chemicals, and electronic related materials based on its core technology of chemistry. Asahi Kasei products include Ceolus™ and Celphere™ microcrystalline cellulose, and NanoAct™ cellulose nanobeads.

Contact:  
[https://www.asahi-kasei.com/contact\\_us/](https://www.asahi-kasei.com/contact_us/)

## **Axcelon Biopolymers Corporation (Canada)**

7-717 Richmond Street,  
London, Ontario N6A 1S2  
<http://axcelonbp.com/>

Axcelon Biopolymers Corporation (ABC) is an innovative biomaterials company focused on leveraging its unique bacterial nanocellulose (BNC) platform technology to develop high-value products for wound care, medical devices, tissue engineering, and industrial applications. Axcelon's products include Nanoderm®, a microfibrillar biosynthetic cellulose film that stimulates the skin's natural regenerative mechanism to help promote quicker wound healing with a one-time application dressing.

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[www.bluegoosebiorefineries.com](http://www.bluegoosebiorefineries.com)

Blue Goose Biorefineries (BGB) is a wholly-owned subsidiary of Nano-Green Biorefineries Inc., a privately held Canadian company. Blue Goose's BGB Ultra™ CNC is an aqueous suspension of carboxylated cellulose nanocrystals that is produced with a transition metal catalyzed oxidative process. Samples of BGB Ultra™ are available at <https://bluegoosebiorefineries.com/shop/>.

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[www.borregaard.com](http://www.borregaard.com)

Borregaard, a leading biorefinery company, has produced commercially available cellulose fibrils since 2016, in Sarpsborg, Norway. Exilva is an insoluble microfibrillated cellulose, which interacts both physically through its extreme surface area and chemically through hydrogen bonding. Its novel nature gives it rheological, mechanical and barrier functionalities, which as an additive, imparts a unique combination of properties in finished product systems. Free samples of Exilva are available online.

Contact:  
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The Netherlands  
+31 (6) 26 337 608

CELLiCON's proprietary G2 technology creates valuable grades of micro and nanocellulose from cellulose-containing feedstocks, such as biomass and textile waste. The innovative process is based on simple molten salt hydrates, and can be operated at low cost with low energy consumption.

Contact:  
<https://www.cellicon.org>  
[info@cellicon.nl](mailto:info@cellicon.nl)

### **CelluComp Ltd (UK)**

Unit 3, West Dock  
Harbour Place  
Burntisland, Fife  
KY3 9DW  
+44 (0)1592 870335  
<https://www.cellucomp.com/>

CelluComp is a Scottish-based company whose "principle activity is to develop and commercialize Curran<sup>®</sup>," CNF, from root vegetables, primarily from sugar beet pulp. Curran is a commercial product. produced as a slurry, with a solids level of approximately 20%.

Contact:  
[enquiries@cellucomp.com](mailto:enquiries@cellucomp.com)



### **CelluForce (Canada)**

2000 McGill College Avenue, 6th Floor  
Montreal, Quebec, H3A 3H3  
514-360-1023  
[www.celluforce.com](http://www.celluforce.com)

CelluForce is the world leader in the development, production and commercialization of Cellulose NanoCrystals (CNC) and formulated products. The company operates the world's largest CNC plant, capable of producing 300 tonnes per year of high-quality sulfated cellulose nanocrystals. The company's products are currently used in several applications including oil and gas completion fluids, cosmetics, paints, coatings and rubber products. CelluForce was created in 2010 and its current shareholders are Domtar, FPInnovations, Schlumberger, Suzano and Investissement Quebec.

Contact:  
[info@celluforce.com](mailto:info@celluforce.com)

### **Cellulose Lab (Canada)**

2 Garland Court, Room 212, Enterprise Bld.  
Fredericton, NB, E3B 5A3, Canada  
[www.celluloselab.com](http://www.celluloselab.com)

Cellulose Lab has been a pioneer in nanocellulose production since 2016, offering a diverse range of nanocellulose products including CNC, CNF, and bacterial cellulose (BC), all available in various forms such as anionic, cationic, hydrophobic, and other specialized forms. CNC capacity is 1kg per day and CNF capacity is 50 kg/day.

Contact:  
[contact@celluloselab.com](mailto:contact@celluloselab.com);

### **Centre Technique du Papier (France)**

Domaine Universitaire - CS 90251  
38044 GRENOBLE - Cedex 9  
+33 (0) 4 76 15 40 15  
<https://www.webctp.com/>

Centre Technique du Papier (CTP) is the French Pulp and Paper Research and Technical Centre located at the University Campus, in Grenoble. CTP, in partnership with FCBA, operates the "NaMiCell" MFC/CNF pilot plant. The plant produces up to 100 kg per day of MFC/CNF in batches of 30 kg to 70 kg in the form of a 3% gel by way of a patented protocol. TEMPO MFC/CNF can also be produced on request.

Contact:  
<https://www.webctp.com/fr/contact/-accés>



## **Chemkey Advanced Materials Technology (Shanghai) Co., Ltd (China)**

B316, No.4226 Duzhuang Road,  
Shanghai, China  
021-64196821  
<http://chemkey.com.cn/>

Chemkey can provide lab samples of cellulose nanocrystals, microfibrillated cellulose, and cellulose nanofibers:

Contact:

<http://en.chemkey.com.cn/c/127.html>

## **Chuetsu Pulp and Paper (Japan)**

282 U.J., Takaoka-shi  
Toyama Prefecture, 933-8533  
0766 26 2401  
[www.chuetsu-pulp.co.jp](http://www.chuetsu-pulp.co.jp)

Chuetsu is a leading pulp and paper producer. In June 2017, Chuetsu started commercial production at Satsuma-Sendai, Kagoshima, Japan, to produce CNF using bamboo, hardwood and softwood bleached kraft pulp as its raw material. Chuetsu manufactures a unique CNF called Nanoforest<sup>®</sup> using the Aqueous Counter-Collision Method ("ACC method"). Nanoforest-S is a commercial product available as 2 wt. % and 10 wt. % solids.

Contact:

<https://www.cpc-cenf.com/form.html>

## **Daicel (Japan)**

Grand Front Osaka Tower-B, 3-1  
Ofuka-cho, Kita-ku, Osaka  
+81 6 7639 7171  
<https://www.daicel.com/en/>

Daicel is a leading Japanese chemical company. Daicel produces CELISH cellulose fiber, microfibrillated by special manufacturing process, and is produced from highly refined, pure fiber raw materials. The raw material fiber is unraveled into tens of thousands of strands, and the fiber thickness is refined to between several  $\mu\text{m}$  and  $0.01\mu\text{m}$ . Because it is refined so that it does not impair the exact basic characteristics of the cellulose raw material (physical and chemical stability etc.), high-value-added product settings are possible.

Contact:

<https://www.daicelmiraizu.com/en/inquiry/index.html>

## **Daio Paper Corporation (Japan)**

Tokyo Headquarters  
Iidabashi Grand Bloom, 10-2  
Fujimi 2 chome, Chiyoda Ward, Tokyo 102-0071  
+81 3 6856 7500  
<http://www.daio-paper.co.jp/en/index.html>

Daio is a full range of papermaking company that manufactures and sells paper, converted paper products, and functional materials. Daio products include cost-competitive ELLEX CNF. ELLEX is available as an aqueous dispersion (capacity 100 tpy), dry powder (capacity 10 tpy), and molded sheet.

Contact:  
<https://www.daio-paper.co.jp/en/contact/form-08/>

## **DKS Co., Ltd. (Japan)**

5 Ogawara-cho, Kisshoin, Minami-ku  
Kyoto 601-8391, Japan  
+81-75-323-5911  
[www.dks-web.co.jp](http://www.dks-web.co.jp)

DKS Co. Ltd. (DKS) focuses on chemistry for a broad range of fields, including textiles, resins, industrial materials, materials for daily living, the environment, and energy. DKS produces carboxymethyl cellulose (CMC) and TEMPO oxidized cellulose nanofibers "RHEOCRISTA" as aqueous functional additives.

Contact:  
<https://www.dks-web.co.jp/english/form/inquiry/>

## **Empa (Switzerland)**

Ueberlandstrasse 129  
8600 Dübendorf / Switzerland  
+41 58 765 11 11  
<https://www.empa.ch/web/empa/>

An institute of the ETH domain., Empa is the Swiss Federal Laboratories for Materials Testing and Research. Empa operates a MFC pilot plant and conducts applications research with industry partners.

Contact:  
<https://www.empa.ch/web/empa/contact-form>

## **Fibenol OÜ (Estonia)**

Mõisa 4, 13522

Tallinn, Estonia

+372 5323 3550

<https://fibenol.com/>

Fibenol has developed a new generation of sugars, high purity hydrolysis lignin, and microcrystalline cellulose (MCC) from hardwood. Fibenol provides three different grades of MCC as aggregated CNC or CNF. The three grades differ in lignin content: crude MCC (25-30% of lignin), blonde MCC (5-10% of lignin), white MCC (less than 5%). Fibenol CNC is disaggregated MCC. Fibenol has the capability to produce 10 tons of each grade of CNC paste, 20 wt%, 30 tons total, 6 tons dry basis.

Contact:

[info@fibenol.com](mailto:info@fibenol.com)

## **FiberLean Technologies Ltd. (UK)**

Par Moor Centre

Par Moor Road, Par, Cornwall PL24 2SQ

[www.fiberlean.com](http://www.fiberlean.com)

FiberLean® Technologies Ltd., a joint venture between Imerys and Omya, was acquired by Werhahn KG in 2021. FiberLean is the leading global producer of Microfibrillated Cellulose (MFC). In FiberLean's proprietary process, pulp and minerals such as calcium carbonate, kaolin and talc are ground together to produce FiberLean® MFC mineral composite. FiberLean MFC plants are available in different capacities ranging from 1,000 tons to over 10,000 tons of FiberLean MFC per year and are installed at paper mills.

Contact:

<https://www.fiberlean.com/contact/>



## **FineCell (Sweden)**

Teknikringen 56-58

SE-114 28 Stockholm

Sweden

[www.finecell.se](http://www.finecell.se)

FineCell has developed a new way to produce dry dispersible nano-sized cellulose from cellulose pulp. The technology is based on research at KTH, Royal Institute of Technology, and is patented globally. FineCell's cellulose has key applications as ingredient for cosmetics, personal & home care products, and paints & coatings. A demo plant is under construction and is expected to be operational in 2025.

Contact:

[peter.axegard@finecell.se](mailto:peter.axegard@finecell.se) (CEO)

[joachim.reimer@finecell.se](mailto:joachim.reimer@finecell.se) (CTO)

## **FPIinnovations (Canada)**

570 Boulevard St-Jean,  
Pointe-Claire, Quebec H9R 3J9 Canada  
+1 (514) 630-4100 or [info@fpinnovations.ca](mailto:info@fpinnovations.ca)  
<http://www.fpinnovations.ca/>

Specializing in innovative scientific solutions, FPIinnovations inaugurated its first CNC research facility with a state-of-the-art pilot plant in 2011. We also produced the first cellulose filaments (CF) in the laboratory and its pilot plant. Today we collaborate with many strategic research alliances, members, and partners. Using the technology developed by our research staff, industry now benefits in developing nanocellulose markets and applications. CelluForce (CNC), Kruger Biomaterials, and Performance Biofilaments (CF) are examples of our collaborations.

Contact:

[stephan.lariviere@fpinnovations.ca](mailto:stephan.lariviere@fpinnovations.ca)

## **GL&V USA Inc. (U.S.)**

1 Cellu Drive  
Nashua, NH 03063  
603-882-2711  
<http://www.glv.com/>

GL&V was acquired by Valmet. See Valmet

## **GranBio USA**

300 Mcintosh Parkway  
Thomaston, Georgia, 30286  
<http://www.granbio.com.br/en/>

GranBio has developed two patented BioPlus® nanocellulose production technologies for different markets, BioPlus® with AVAP® and BioPlus® with GreenBox®. Both processes are demonstrated at the scale of 1/2 tpd at GranBio Biorefinery in Thomaston, Georgia. These processes allow for the economical extraction of commercial-scale nanocellulose from any biomass with adjustable particle size and composition. Nanocellulose fibrils produced through the chemical-free GreenBox process have exceptionally low cost that enables their use in large volumes.

Contact:

Kim Nelson, CTO Nanocellulose  
[knelson@granbio.com](mailto:knelson@granbio.com)

## **Guilin Qihong Technology Co. Ltd. (China)**

12 Jiangan Road, Qixing District,  
Guilin City, Guangxi Province.  
156#7706#2278

<http://www.qh-tech.cn/en/h-default.html>

Guilin Qihong Technology Co., Ltd. focuses on research for the production and application of cellulose Nanofiber. Our products include carboxylated cellulose nanofibers (CNF), sulfate esters nanocrystals (CNC), hydrophobic nanocellulose (hydrophobic-CNC), and bacterial cellulose (BC). We own several national patents for inventions and processing technology and we are sincerely looking forward to cooperating with partners.

Contact:

Email [414328106@qq.com](mailto:414328106@qq.com)

## **Hangshi Technology Development (Hangzhou) Co., Ltd. (China)**

No.168 Qianwu Road, Qingshanhu Science and Technology City,  
Lin'an District, Hangzhou City, Zhejiang Province, China  
+86-572-8276858

[http://www.hangshitech.com/index\\_en.html](http://www.hangshitech.com/index_en.html)

Led by Hangzhou Research Institute of Chemical Industry Co. with Zhejiang University Quzhou Research Institute, Hangshi Group, Jingxiu Environmental Protection, Dubai Technology, and other research institutes and enterprises, Zhejiang Biodegradable and Nano Materials Innovation Center is a new type of industry-university-research innovation alliance with the strong support of governments at all levels of the country. The Innovation Center and South China University of Technology and has built a 100kg/d micro and nano cellulose green pilot test line.

Contact:

[http://www.hangshitech.com/contact\\_en.html](http://www.hangshitech.com/contact_en.html)

## **Hansol Paper (South Korea)**

23-24F, Tower B, 100, Eulji-ro, Jung-gu,  
Seoul, Republic of Korea

<https://www.hansolpaper.co.kr/eng/main>

Hansol is a leading producer of paper and biomaterials. Hansol Paper has been concentrating its investment on developing nanocellulose from pulp since 2010, and set up the production system in late 2018. Hansol's goal is to advance into the material industry beyond the paper industry through nanocellulose, which has great potential for business expansion across different industries.

Contact:

<https://www.hansolpaper.co.kr/eng/customer/inquiry>

## **Holmen AB (Sweden)**

PO Box 5407  
SE-114 84 Stockholm  
+46 8 666 21 00  
[www.holmen.com](http://www.holmen.com)

One of the largest forest owners in Sweden, Holmen is a major producer of paper, paperboard and wood products, plus renewable energy from wind and water. Holmen is also a 42.4% owner of Melodea Ltd., a producer of CNC.

Contact:

<https://www.holmen.com/en/contacts/>

## **InnoTech Alberta (Canada)**

250 Karl Clark Road  
Edmonton, AB T6N 1E4  
780-450-5111  
[www.innotechalberta.ca](http://www.innotechalberta.ca)

InnoTech Alberta, a subsidiary of Alberta Innovates, is a leading research and technology organization serving the needs of industry, entrepreneurs, and public sector. Our organization's multidisciplinary expertise, cross-sector teams, and pilot-scale research facilities accelerate technology development. InnoTech Alberta operates a cellulose nanocrystals (CNC) pilot plant that can produce up to 20 kg per week of CNC from a variety of feedstocks.

Contact:

[info@innotechalberta.ca](mailto:info@innotechalberta.ca).

## **Innotech Materials LLC (U.S.)**

10437 Innovation Drive, Suite 324  
Wauwatosa, WI 53226  
414-488-2092  
<http://www.innotechmaterials.com/>

Innotech Materials has developed a process for catalytic oxidation of commercial cellulose to produce hydrophobic and hydrophilic nanocellulose. Innotech products include: Oxidized Nanocellulose for applications in polymer biocomposites; Methyl Nanocellulose and Hydroxypropyl Methyl Nanocellulose for personal care, cosmetics, and pharmaceuticals; Carboxy Methyl Nanocellulose for bioadhesives; Hydrophobic Nanocellulose for bioplastic packaging.

Contact:

[info@innotechmaterials.com](mailto:info@innotechmaterials.com).



## **Innovatech Engineering (U.S.)**

1650 Summit Lake Dr. Suite 103  
Tallahassee, FL 32317  
United States  
(850) 391-2396  
<https://innovatech.us/>

Innovatech is focused on bringing new technology to the market, specifically the commercialization of nanocellulose. Innovatech produces Nanopaper nanocellulose sheets in thicknesses from 0.012 to 0.015 millimeters. Nanopaper can be translucent, or transparent, made from TEMPO oxidized cellulose nanofibers.

Contact:  
[info@innovatech.us](mailto:info@innovatech.us)

## **Innventia (Sweden)**

See RISE.

## **Klabin S.A. (Brazil)**

Avenida Brigadeiro Faria Lima  
3600 - 3, 4 e 5 andares, Itaim B  
Sao Paulo 04.538-132  
+55 11.30465800  
<https://www.klabin.com.br/en/home/>

Klabin is Latin America's leading producer of containerboard, boxboard and packaging papers. In February 2018, Klabin acquired a minority interest in Israel-based Melodea Ltd., a producer of cellulose nanocrystals. In September 2018, Klabin announced an investment of Real 32 million for its research and development program for the construction of a Pilot Mill Complex in Telêmaco Borba (Paraná) to begin operating in 2019. The complex was developed to conduct testing and research on MFC to be incorporated into the company's paper production lines.

Contact:  
<https://www.klabin.com.br/general/contact-us/contact-us/>

## **Kruger (Canada)**

3285, Chemin Bedford  
Montréal, Québec H3S 1G5  
514-343-3100  
<http://bio.kruger.com/>

Kruger Inc. is a major Canadian producer of tissue products, renewable energy, paper and paperboard made from recycled fibers, specialty papers for eco-friendly food packaging and labelling products, and cellulosic biomaterials. In September 2013, Kruger Biomaterials formed a strategic alliance with FPIInnovations to produce and commercialize cellulose filaments, a form of cellulose nanofibrils. FiloCell is produced at 30% solids, with width of 30-500 nm, and most frequently 80-300 nm, and with length of 100-2,000 µm. Current capacity is 6,000T/y.

Contact:  
<http://biomaterials.kruger.com/contact-us/>

## **Marubeni (Japan)**

4-2, Ohtemachi 1-chome, Chiyoda-ku,  
Tokyo 100-8088, Japan  
[81] (3) 3282-2111  
<https://www.marubeni.com/en/>

Marubeni Corporation and its consolidated subsidiaries use their broad business networks, both within Japan and overseas, to conduct importing and exporting, as well as domestic business, encompassing a diverse range of business activities across wide-ranging fields including lifestyle, ICT business & logistics, food, agri business, forest products, chemicals, and much more. In 2022 Marubeni and Chuetsu Pulp announced new agricultural material that uses the ACC cellulose nanofiber nanoforest® manufactured by Chuetsu. See Chuetsu.

Contact:  
[https://www.marubeni.com/en/contact\\_form/](https://www.marubeni.com/en/contact_form/)

## **Melodea Ltd. (Israel)**

Faculty of Agriculture  
The Hebrew University of Jerusalem  
76100 Rehovot  
[www.melodea.eu](http://www.melodea.eu)

Melodea was founded in 2010 by researchers from the Hebrew University in Israel and industrial experts from the clean-tech sector. Melodea is backed by investors from the pulp and paper industry: Holmen, Klabin, Double A, Bazan Group, and Asia Plus. Melodea has developed a unique technology for the extraction and production of CNC from wood pulp and paper production side streams. Melodea's focus is CNC-based barrier coatings, including MelOx for oxygen barrier, and VBSeal and VBCoat for oil and grease and water vapor barrier,

Contact:  
[info@melodea.eu](mailto:info@melodea.eu)

## **Navitas d.o.o (Slovenia)**

Podcerkev 1A  
1386 Stari trg pri Ložu  
Slovenia (EU)  
+386 41 648 879  
<https://www.nanocrystacell.eu/>

Navitas started production of Nanocrystacell CNC in 2020 in Slovenia following development beginning in 2018. Capacity is 10 tonnes per year, and the glycol-based process results in CNC with negligible sulfur content. Nanocrystacell is available as freeze vacuum dried powder or aqueous suspension. Capacity is 50 tonnes per year, dry basis.

Contact:  
[contact@nanocrystacell.eu](mailto:contact@nanocrystacell.eu)

## **Nippon Paper Industries Co., Ltd. (Japan)**

Ochanomizu Sola City

4-6, Kandasurugadai, Chiyoda-ku, Tokyo 101-0062, Japan

Tel: +81-(0)3-6665-1111

<https://www.nipponpapergroup.com/english/products/cnf/>

Nippon Paper is Japan's largest manufacturer of paper and paperboard, and is also one of the world's largest producers of CNF with capacity for 560 tonnes per year. In October 2013, Nippon established the first pre-commercial plant in Japan at its Iwakuni mill. Nippon later started operations at the Ishinomaki Mill (TEMPO), the Fuji Mill (Kyoto Process), and the Gotsu Mill for food and cosmetics additives. Nippon Paper's work with CNF is focused on composites, cosmetics, filtration, gas barrier films and health care products.

Contact:

<https://www.nipponpapergroup.com/english/inquire/>

## **Nordic Bioproducts Group (Finland)**

Office & BIG R&D Lab

Tietotie 1A, 02150 Espoo, Finland

<https://nordicbioproducts.fi/>

Nordic Bioproducts Group (NBG) is a Finnish producer of microcrystalline cellulose (MCC) at a capacity of 10,000 tonnes/year. The Aaltocell™ technology minimizes energy, chemical and water usage, as well as waste generation, resulting in MCC with a markedly reduced carbon footprint compared to the market standard. The MCC exhibits unique, tailorable properties that widen the application horizon from pharma, food and cosmetics towards high performance materials. Furthermore, NBG converts MCC into carboxylated cellulose nanomaterials at a pilot scale.

Contact:

Kalle Riihinen

[kalle.riihinen@nbg.fi](mailto:kalle.riihinen@nbg.fi)

## **Norske Skog ASA (Norway)**

PB 294 Skøyen

0213 Oslo, Norway

<https://www.norskeskog.com/products/energy-bio-products/cebina>

Norske Skog installed their MFC pilot plant at Saugbrugs in 2017 with an announced capacity of 365 tonnes of CEBINA™ MFC. Recently they have reported progress in areas of water-based paint. In 2022 the application of MFC in solvent free epoxy spray was announced and the company has supplied material to three industry-scale projects in onshore fish farming, drinking water treatment and storage. Progress in fibre and particle boards has also been reported.

Contact:

[CEBINA@norskeskog.com](mailto:CEBINA@norskeskog.com)

## **Oji Holdings (Japan)**

47-5, Ginza 4-chome  
Chuo-ku, Tokyo 104-0061  
+81 3 3563 1111

<https://www.ojiholdings.co.jp/english/>

Oji is a leading Japanese paper company. Oji produces CNF through nanofibrillation of pulp, and has developed a manufacturing process using a unique chemical treatment, “phosphorylation,” which enables Oji to produce CNFs with high quality (high transparency, high viscosity, and thixotropy). Oji manufactures transparent CNF slurry and coarse CNF slurry (AUROVISCO), hydrophobic CNF powder, and CNF sheet (AUROVEIL).

Contact:

[https://www.ojiholdings.co.jp/english/r\\_d/contact.html?frmid=29](https://www.ojiholdings.co.jp/english/r_d/contact.html?frmid=29)

## **Performance BioFilaments Inc. (Canada)**

Suite 1120, 700 West Street  
Vancouver, BC, Canada V6C 1G8  
(1) 604 806-0261

[www.performancebiofilaments.com/](http://www.performancebiofilaments.com/)

Performance BioFilaments, Inc. was launched in 2014 as a joint venture between Mercer International, Inc. and Resolute Forest Products. Performance BioFilaments supplies BioFilaments supplies NanoFibrillated Cellulose (NFC) as wet crumb (30% solids), and as a dispersed pumpable slurry (2-10% solids).

Contact:

Keith Gourlay, Director of Technology Development

[kgourlay@performancebiofilaments.com](mailto:kgourlay@performancebiofilaments.com)



### **Re-Fresh Global (Germany)**

c/o B-Part Am Gleisdreieck  
Luckenwalder Str. 6b  
10963 Berlin  
<https://re-fresh.global/>

Re-Fresh Global is a biotech company with a patented process that converts textile waste into nanocellulose materials called **Re-Nano™**

**Re-Nano™** is a patented microfibrillated cellulose that enhances the strength, stability, and flexibility of numerous natural products and can replace current virgin and synthetic additives, thereby significantly reducing your company's carbon footprint as an eco-friendly solution. Re-Fresh Global offers a range of valuable resources for over 14 industries, including Re-SanPulp, a customizable textile pulp made from recycled synthetic fibers, and Re-Thanol, a bio-ethanol with diverse industrial applications. [video](#)

Contact:

[community@re-fresh.global](mailto:community@re-fresh.global)

### **RISE Research Institutes of Sweden AB (Sweden)**

Sven Hultins plats 5, 412 58,  
Gothenburg, Sweden  
[010-516 50 00](tel:010-516 50 00)  
<https://www.ri.se/en>

RISE is Sweden's research institute and innovation partner. RISE Innventia, an early leader in the development of MFC, reduced energy usage in producing MFC through six generations of development, including enzymatic pretreatment. RISE operates a 100 kg/day MFC pilot plant at Innventia and a mobile demonstration plant for MFC trials at mills around the world. The mobile demo plant is able to produce highly refined fiber (HF), highly refined enzyme treated fiber (HFE) or MFC at the rate of 100 kg of dry product per hour.

Contact:

<https://www.ri.se/en/about-rise/contact-us>

## **RISH Research Institute for Sustainable Humansphere (Japan)**

Kyoto University

Gokasho, Uji City, Kyoto Prefecture, Japan. 611-0011

+774-38-3346

<https://www.rish.kyoto-u.ac.jp/?lang=en>

The RISH at Kyoto University is a leader in cellulose nanofibril research. Professor Hiroyuki Yano of RISH was the first in Japan to become engaged in the research of cellulose nanofibers. The Kyoto Process is based on the "Pulp Direct-Kneading Method." RISH has a pilot plant with capacity of 1 tpy of thermoplastic resins with 10 wt. % CNF. One application is the Nanocellulose Vehicle (NCV): the use of CNF in 13 components enables weight reduction of 16% compared to standard vehicles. <https://www.youtube.com/watch?v=06H8wP9axjU>

Contact:

Prof. Hiroyuki Yano

[yano@rish.kyoto-u.ac.jp](mailto:yano@rish.kyoto-u.ac.jp)

## **Sappi | Valida (The Netherlands)**

Sappi Biochemtech BV

Biesenweg 16 | 6211 AA Maastricht | The Netherlands

<https://www.sappi.com/valida-home>

Sappi is a leading global provider of everyday materials made from woodfibre-based renewable resources. As a diversified, innovative and trusted leader focused on sustainable processes and products, we are building a more circular economy by making what we should, not just what we can. Our market offerings such as dissolving pulp, wood pulp, biomaterials, timber, packaging and speciality papers, graphic papers, casting and release papers and forestry products are manufactured from woodfibre sourced from sustainably managed forests and plantations, in production facilities powered, in many cases, with bio-energy from steam and existing waste streams. Sappi Valida is a leading producer of fibrillated cellulose with naturally derived functionality for a wide range of applications including personal care, agriculture, coatings, construction additives and packaging. Sappi Valida is available in commercial volumes from a number of production facilities.

Contact:

[Valida@sappi.com](mailto:Valida@sappi.com)

## **ScienceK (China)**

Zhejiang, China

<http://www.sciencek.com>

ScienceK, a pioneer in the nanocellulose industry, provides a full range of scientific research services. Science K provides CNC 5 kg/day dry power; CNF 200 kg/day, 1% by mechanical method; CNF 200kg/day 1% TEMPO plus mechanical; BC, 200 kg/day 5%.

Contact:

[sciencek@qq.com](mailto:sciencek@qq.com)



### **Seiko PMC Corporation (Japan)**

Wakamatsu Bldg. 8th Floor, 3-6, Nihonbashi Honcho 3-chome,  
Chuo-Ku, Tokyo, Japan 103-0023  
+81-3-6202-7331

<http://www.seikopmc.co.jp>

Seiko PMC Corporation produces papermaking chemicals and resin products. Seiko produces STARCEL® CNF resin composite using the Kyoto Process.

Contact:

[http://www.seikopmc.co.jp/cgi-bin/contact\\_e.cgi](http://www.seikopmc.co.jp/cgi-bin/contact_e.cgi)

### **Shengquan Group (China)**

Shengquan Industrial Park,  
Zhangqiu District, Jinan City, Shandong Province, China

<https://e.shengquan.com>

The Jinan Shengquan Group Share-Holding Co., Ltd. industrial layout includes biorefinery, high-performance resin and composites, foundry materials, health & pharmaceutical industry, new energy, etc. Shengquan 超变力® nanocellulose is made of plant fiber as raw material and has diameter is less than 100nm and aspect ratio not less than 200. It can be modified into anionic, cationic, silane-coupled chemical functional nanocellulose by oxidation, lipidation, silanization and other modification technologies.

Contact:

[zacktang@shengquan.com](mailto:zacktang@shengquan.com)

### **Stora Enso Oyj (Finland)**

PO Box 309  
FI-00101 Helsinki  
+358 20 46 131

<http://www.storaenso.com/>

Stora Enso was one of the first companies to successfully launch paperboard enhanced with MFC commercially.

Contact:

<https://www.storaenso.com/en/contact-us>

## **Sugino Corp. (Japan)**

1380 Hamilton Pkwy.

Itasca, IL 60143

888.784.4661

[www.suginocorp.com](http://www.suginocorp.com)

Star Burst, Sugino's full line of wet jet milling devices, disperse, emulsify, pulverize, and reform surfaces of raw materials by obliquely colliding the particles pressurized up to 245 MPa at the relative velocity of Mach 4. Star Burst does not use any grinding media and can deliver homogenized particle size with minimal contamination. BiNFi-s are Sugino original nano-sized nanofibers utilizing Star Burst technology. They are biomass fibers of cellulose, chitin, chitosan, and silk with 10 to 20nm diameter and multiple micron lengths.

Contact:

[kyoneda@suginocorp.com](mailto:kyoneda@suginocorp.com)

## **Suzano Papel e Celulose S.A. (Brazil)**

Av. Brigadeiro Faria Lima

1355 – do 6º ao 8º andar

Pinheiros

CEP 01452-919

São Paulo, SP, Brasil

[www.suzano.com.br](http://www.suzano.com.br)

Suzano is the largest pulp manufacturer in the world, the leader in the toilet paper segment in Brazil and one of the largest paper producers in Latin America. In Brazil, Suzano produces microfibrillated cellulose in a 700 tpy (dry basis) pilot plant, and in 2023 started operations of an industrial-scale plant with capacity of 20 ktpy (dry basis). Woodspin, a joint venture between Suzano and Spinnova, also started operations in 2023. With Woodspin, Suzano produces MFC on site in Finland for use in Spinnova textiles. Suzano is also an equity partner in CelluForce.

Contact:

<https://www.suzano.com.br/en/products-and-brands/raw-material/microfibrillated-cellulose>

## **TPI Chemicals FZCO (UAE)**

Premises No:HD155, Floor No:25, Sheikh Rashid Tower,

Dubai World Trade Centre, Dubai, UAE

+ 90 536 561 3709

<https://www.tpi-chemicals.com/>

TPI Chemicals is a know-how based and technology oriented Cellulosic Polymers Developer and Supplier. MFC (Micro fibrillated Cellulose) is one of the Cellulose Derivatives TPI Chemicals develops and supplies. Please feel free to contact us for more information.

Contact:

e-mail: [info@tpi-chemicals.com](mailto:info@tpi-chemicals.com)

## **University of Maine (U.S.)**

### **The Process Development Center**

5737 Jenness Hall

Orono, ME 04469

207-581-2237

<https://umaine.edu/pdc/>

The Process Development Center (PDC) offers a broad range of technical services and resources. The University of Maine (UMaine) Nanomaterial Pilot Plant opened in 2012 at the PDC and is a joint project with the US Forest Service. The pilot plant has capacity for 1 ton per day of CNF and is the largest CNF plant in the US. The UMaine PDC supplies cellulose nanofibrils (CNF) and cellulose nanocrystals (CNC) to academic, public, and private research groups interested in evaluating and developing applications for these materials.

Contact:

[umaine.pdc@maine.edu](mailto:umaine.pdc@maine.edu)

## **UPM Biomedicals (Finland)**

Alvar Aallon katu 1

P.O. Box 380

00101 Helsinki, Finland

+358 204 15 111

<https://www.upmbiomedicals.com/>

UPM Biomedicals offers our natural biocompatible innovation, UPM Nanocellulose. UPM Nanocellulose is already used in in vitro 3D cell culture (>180 protocols available for GrowDex®), in in vivo cell transplantation, in bioinks (GrowInk™) and in CE-marked wound dressings (FibDex®, medical device class II). We already supply several companies, such as BICO AB (Cellink), with our material for formulation of their own products. UPM also offers licenses for specific application fields.

Contact:

[biomedicals@upm.com](mailto:biomedicals@upm.com)

## **USDA Forest Service, Forest Products Laboratory (U.S.)**

One Gifford Pinchot Drive

Madison, WI 53726

608-231-9200

<https://www.fpl.fs.usda.gov/>

In 1910, the US Forest Service, Forest Products Laboratory (FPL) was established in Madison, Wisconsin. In August 2012, the US Department of Agriculture (USDA) Forest Service Forest Products Laboratory (FPL) unveiled a \$1.7 million production facility for renewable, forest-based nanomaterials. This facility was the first of its kind in the United States. The FPL pilot plant produces CNC and TEMPO-based CNF with weekly production capacity of 30 kg or 5 kg, respectively.

Contact:

<https://www.fpl.fs.usda.gov/contact/index.php>

## **VTT Technical Research Centre of Finland**

PO Box 1000  
FI-02044 VTT  
+358 20 722 111  
[www.vtt.fi](http://www.vtt.fi)

VTT, a non-profit research organization, can make various MFC and CNF grades for application testing. These grades can be produced from customer's raw materials with varying degrees of fibrillation (coarse, medium, fine fibre size). VTT can also produce specific aseptic grades for cosmetic and pharmaceutical applications. VTT produces tailor-made samples for R&D purposes from lab to pilot scale using standard equipment such as Masuko grinders and microfluidizers, unmodified, chemically modified, and enzymatically aided, up to 20 kg/day.

Contact:  
Erkki Hellen  
[erkki.hellen@vtt.fi](mailto:erkki.hellen@vtt.fi)  
+358 20 722 7422

## **Weidmann Fiber Technology (Switzerland)**

Neue Jonastrasse 60  
8640 Rapperswil SG  
Switzerland  
<https://weidmannfibertechnology.com/>

Part of Weidmann Holding AG, Weidmann Fiber Technology operates a production plant that produces Celova® microfibrillated celluloses and cellulose powder. The purely mechanical process uses no chemical or enzymatic pretreatment. Raw materials include pulp and perennial plants. Applications include personal care, barrier and film coatings, home and industrial care, energy storage, paints and adhesives.

Contact:  
<https://weidmannfibertechnology.com/#Contact%20us>

## **Werhahn KG (Germany)**

Acquired FiberLean in 2021. See FiberLean.

## **Woodspin (Finland)**

A joint venture between Suzano and Spinnova. See Suzano.

## **Zelfo Technology GmbH (Germany)**

Am Wasserturm 1,  
16247 Joachimsthal  
UNESCO Biosphere Schorfheide-Chorin,  
Brandenburg, Germany  
+49 (0)33361 64931  
<https://www.zelfo-technology.com>

We specialise in producing fibrillated macro (MaFC) micro (MFC) and nano (NFC) cellulose fibres, either as separate entities or in controlled mixtures. Zelfo Technology's experience in these fields extends to sources from pre-processed and non-processed ligno-cellulosic fibres and we aim to generate the best performance properties from all constituent parts of the source material. Engineered fibres perform as biobased binders, composites and absorbents etc.

Contact:  
<https://www.zelfo-technology.com/about-us-contact>

## **Zhejiang Jinjiahao Green Nanomaterial co., ltd (China)**

No.37 Venus Road, Longyou Industrial Zone,  
Quzhou City, Zhejiang Province, China  
0570—7566665  
<http://www.cnijh.cn/>

Zhejiang Jinchang Specially Paper Co., Ltd. was founded in March 2009. The company specializes in design, development, production, processing, and sale of specially papers. Jinjiahao nanofibers allow new or improved products and processes in different applications.

Contact:  
<http://www.cnjcpaper.com/contacten.aspx>

# Equipment and Technology Providers

## **Betulium Oy (Finland)**

Tekniikantie 2,  
FI-02150 Espoo  
Finland  
[www.betulium.com](http://www.betulium.com)

Betulium was sold to KCL. See KCL.

## **Chemstone (U.S.)**

18066 Ventura Blvd Encino, CA 91316  
818) 757-1305  
<https://chemstone.com/>

In 2023 Chemstone acquired HS Manufacturing Group (HSMG), a technology provider focused on biodegradable packaging solutions. PROTĒAN® is an environmentally friendly and non-toxic barrier coating and additive technology platform that can deliver critical water, oil and grease resistance properties. PROTĒAN® has been proven to provide excellent oil and grease barrier, especially when combined with wet end surface applications of MFC or CNF, and the performance can be further improved with the addition of MFC or CNF in the base sheet.

Contact:  
<https://chemstone.com/contact-us.html>

## **Fibenol OÜ (Estonia)**

Mõisa 4, 13522  
Tallinn, Estonia  
+372 5323 3550  
<https://fibenol.com/>

In 2023 Fibenol acquired the Sunburst™ reactive extrusion process that deconstructs biomass into lignin, hemicellulose and cellulose in 20 seconds, and with further enzymatic hydrolysis can yield low-cost CNC or CNF. In March 2022 Fibenol received final acceptance of its first commercial Sunburst unit at the Sweetwoods Project in Estonia. Fibenol will consider joint product development agreements, as well as licensing and other partnership structures to continue to deploy the technology commercially. Samples can be available subject to NDA and MTA.

Contact:  
[info@fibenol.com](mailto:info@fibenol.com)



## GL&V (U.S.)

GL&V was acquired by Valmet in 2019. Please see Valmet.

## Hielscher Ultrasonics GmbH (Germany)

Oderstr. 53, 14513 Teltow, Germany

+1 (973) 532-6488

<https://www.hielscher.com/ultrasonic-homogenizers-for-liquid-processing-3.htm>

Hielscher Ultrasonics specializes in the design and manufacturing of high- power ultrasonic homogenizers for lab, bench-top and production level. Ultrasonic power is an effective and energy-efficient means to apply high shear and intense stress to liquids, powder/liquid mixtures and slurries. Hielscher equipment includes devices for the ultrasonication of any liquid volume, from several microliters through hundreds of cubic meters per hour.

Contact:

[info@hielscher.com](mailto:info@hielscher.com)



## KCL (Finland)

KCL Oy Keskuslaboratorio-Centrallaboratorium Ab

Tekniikantie 2

FI-02150 Espoo, Finland

+1 358 40 5227104

KCL is Europe's leading open access pilot and laboratory service provider. Services include biomaterial processing, extrusion and dispersion coating and lamination, laboratory services and more. KCL hosts the BIOHUB cluster tailored for the biomaterials sector with a dedicated space for testing, piloting, and laboratory facilities. In 2013, KCL acquired Betulium Oy, a producer of MFC from industrial side-streams such as sugar beet pulp. In addition, KCL has pilot-scale production of cationized, phosphorylated, and sulphated cellulose nanofibers (CNF).

Contact:

Dr. Antti Laukkanen, R&D director

[antti.laukkanen@kcl.fi](mailto:antti.laukkanen@kcl.fi)

## **Masuko Sangyo Co., Ltd. (Japan)**

1-12-24 Honcho, Kawaguchi-city,  
Saitama-pref, JAPAN 332-0012  
+81-48-222-4343

<http://www.masuko.com/English/index.html>

In 1965, Masuko became the first manufacturer in the world to commercialize an innovative friction grinder using a grinding wheel, the "Supermasscollider" Since then, Masuko has introduced a broad range of machines that achieve ultra-fine pulverization for an expanding range of materials, including the production of cellulose nanofibrils (CNF). Masuko grinders are in commercial production of CNF at various locations globally.

Contact:

<http://www.masuko.com/English/form/index.php>

## **MetGen (Finland)**

Rakentajantie 26  
20780 Kaarina, Finland  
+358 2 237 7077

<https://www.metgen.com/>

MetGen is a privately held company founded in 2008 on the core competence of genetic engineering and synthetic biology. Today MetGen offers a full range of biotechnology solutions, including enzymes to support biorefineries. Full technology solutions are not only in the field of hydrolysis for biomass fractionation, but also for the production of clean sugars, sugar fermentation, and lignin refining. METNIN™ is a unique market driven technology to valorize the lignin streams from modern biorefineries, and pulp mills.

Contact:

<https://www.metgen.com/contact-us/>

## **Microfluidics International Corporation (U.S.)**

90 Glacier Drive, Suite 1000  
Westwood, MA 02090  
Telephone: +1 (617)-969-5452

<https://www.microfluidics-mpt.com/>

Microfluidics International Corporation, the manufacturer of Microfluidizer® high shear fluid processors, is a leader in the design and production of laboratory and commercial processing equipment used in the production of micro- and nano-scale materials including nanocellulose. Microfluidizer® technology is employed in the production of cellulose nano- and micro- fibrils at corporations and research centers around the globe.

Contact:

<https://www.microfluidics-mpt.com/contact-us>

## **Sugino Corp. (Japan)**

1380 Hamilton Pkwy.

Itasca, IL 60143

888.784.4661

[www.suginocorp.com](http://www.suginocorp.com)

Star Burst, Sugino's full line of wet jet milling devices, disperse, emulsify, pulverize, and reform surfaces of raw materials by obliquely colliding the particles pressurized up to 245 MPa at the relative velocity of Mach 4. Star Burst does not use any grinding media and can deliver homogenized particle size with minimal contamination. BiNFi-s are Sugino original nano-sized nanofibers utilizing Star Burst technology. They are biomass fibers of cellulose, chitin, chitosan, and silk with 10 to 20nm diameter and multiple micron lengths.

Contact:

[kyoneda@suginocorp.com](mailto:kyoneda@suginocorp.com)



## **Valmet North America (U.S.)**

3720 Davinci Court

Norcross, GA 30092

[www.valmet.com](http://www.valmet.com)

Valmet is a leading global developer and supplier of process technologies, automation, and services for the pulp, paper, and energy industries. For MFC production, Valmet has a unique, refiner-based technology. The production process combines advanced refiner and plate technology with an innovative control system designed to maximize production efficiency. Valmet MFC can use disk or conical refining technology to produce MFC in either a batch or continuous refining process. Valmet's MFC Business Research Team has a pilot research plant in Finland and an alliance with the University of Maine Process Development Center (PDC) in the US.

Contact:

David Cowles

[david.cowles@valmet.com](mailto:david.cowles@valmet.com)

## **Vireo Advisors LLC (U.S.)**

WBENC Certified Woman Owned Business

P.O. Box 51368, Boston, MA 02205 USA

<https://www.vireoadvisors.com>

Vireo Advisors, LLC is an international expert advising firm with significant experience supporting the commercialization of novel forms of celluloses and other biobased materials. We conduct occupational and product-specific safety evaluations and create market and regulatory documentation and roadmaps to set clear expectations, reduce business risk, and inform product design. Tapping into our broad network, we build consortia, identify opportunities, and convene key stakeholders to identify solutions to complex problems.

Contact:

<https://www.vireoadvisors.com/contactus>

# Government, University, Research, and Other

## **Aalto University (Finland)**

Aalto University

P.O. Box 11000 (Otakaari 1B)

FI-00076 AALTO

+358 9 47001

<https://www.aalto.fi/en/department-of-bioproducts-and-biosystems/biobased-materials-technology>

The biobased materials technology group (BIOMAT) led by Dr. Maloney carries out research in the development of next generation fiber products. The target is to develop technologies that enable renewal of the paper and board industries: nanocellulose films, nanopapers and nanostructuring of fibers for high-bulk board. Various grades of nanocellulose can be produced in our labs. Specialized methods for measuring nanocellulose quality are available. Methods for measuring nanocellulose/water interactions including water removal are especially notable.

Contact:

[thaddeus.maloney@aalto.fi](mailto:thaddeus.maloney@aalto.fi)

## **Agroforestry Nanotechnology Research Group (GNanoAgro-UFPR) (Brazil)**

632 Lothario Meissner Avenue

Curitiba, Paraná State, Brazil 80210170

+55 41 3360 4223

[www.gnanoagro.ufpr.br](http://www.gnanoagro.ufpr.br)

The Agroforestry Nanotechnology Research Group (GNanoAgro/UFPR), associated with LCNano/UFPR within the SisNANO Network (MCTI, Federal Government of Brazil), specializes in education, innovation, scientific and technological research, and technical consulting services for public or private institutions. Our focus includes developing new nanostructured products from natural fibers, enhancing polymeric nanocomposites, and modifying surface materials for various applications.

Contact:

<https://gnanoagro.ufpr.br/contato/>

## **Alberta Innovates (Canada)**

250 Karl Clark Road

Edmonton, BC T6N1E4

780-427-1956

[www.albertainnovates.ca](http://www.albertainnovates.ca)

See InnoTech Alberta in the Producers Section.

## **Auburn University (U.S.)**

Auburn, Alabama 36849

(334) 844-4000

<https://www.auburn.edu/>

## **Beijing Forestry University (China)**

No. 35 Tsinghua East Road

Haidian District, Beijing, P.R. China

<http://eng.bjfu.edu.cn/>



## **BioApplied Innovation Pathways (Canada)**

1 Research Drive, Suite 107

Dartmouth, NS B2Y 4M9

+1 (902) 701-9761 (office)

<https://bioapplied.com/>

BioApplied™ provides business services to support the circular bioeconomy. These services include ecosystem development, business research, and business development and product deployment – with deep experience commercializing nano-cellulosic materials. Since our formation in 2011, we have built an exceptional Network of Industrial, Technical, Academic, Government, Entrepreneurial, and Financial expertise.

We welcome your call and will be delighted to discuss, explore, discover...

Contact:

[greg.maloney@bioapplied.com](mailto:greg.maloney@bioapplied.com)

+1 (514) 497-0360 (mobile)

## **BioPRIA (Australia)**

Monash University

15 Alliance Lane

Clayton 3800, Australia

+61 3 99053456

<https://www.monash.edu/>; <https://www.biopria.com.au/>

BioPRIA at Monash University has lab refiners, homogenisers and reactors for producing CNC, CNF and TOCN at the 10-100s of gram scale. The Institute has developed new methods for characterizing cellulose nanomaterials and can rapidly manufacture 10-200 freestanding pure and composite cellulose nanofiber films using spray coating. The Institute has a comprehensive suite of equipment for measuring nanocellulose film properties, including barrier performance.

Institute Contact:

<https://www.biopria.com.au/contact/>

## **BioProducts Institute (Canada)**

See University of British Columbia.

## **Biorenewable Deployment Consortium LLC (U.S.)**

2875 Ashton Road

P.O. Box 17182

Sarasota, FL 34276

<https://biorenewabledc.com/>

The Biorenewable Deployment Consortium LLC (BDC) is an international company that assists its membership with the deployment of leading-edge advanced biofuels, biochemicals, and bioproducts technologies that do not require long-term subsidy making them more profitable and sustainable. The company identifies, performs due diligence, and promotes those processes that add value to its member companies under its brokering partnership initiatives.

Contact:

[Eric.Horn@biorenewabledc.com](mailto:Eric.Horn@biorenewabledc.com)

## **Center for Renewable Carbon (U.S.)**

See University of Tennessee.

## **Centre Technique du Papier (France)**

Domaine Universitaire - CS 90251

38044 GRENOBLE - Cedex 9

+33 (0) 4 76 15 40 15

<http://www.webctp.com/gb/default.cfm>

Centre Technique du Papier (CTP) is the French Pulp and Paper Research and Technical Centre located at the University Campus, in Grenoble. CTP, in partnership with FCBA, operates the "NaMiCell" MFC/CNF pilot plant. The plant produces up to 100 kg per day of MFC/CNF in batches of 30 kg to 70 kg in the form of a 3% gel by way of a patented protocol. TEMPO MFC/CNF can also be produced on request.

Contact:

<https://www.webctp.com/en/contact/-access>

## **CERMAV-CNRS Domaine Universitaire (France)**

601 Rue de la Chimie,  
38610 Gières, France  
+33 (0)4 76 03 76 03  
<https://cermav.cnrs.fr/en/>

The CERMAV, the Centre de recherches sur les macromolécules végétales, is a CNRS research unit. CERMAV is a leader in glycosciences in Europe, focused on cellulose and lignin.

Contact:  
[direction@cermav.cnrs.fr](mailto:direction@cermav.cnrs.fr)

## **CETIM (Spain)**

CETIM TECHNOLOGICAL CENTRE  
Parque Empresarial de Alvedro calle H-20. 15180 Culleredo, A Coruña, Spain  
+34 881 105 624  
<https://cetim.es/>

CETIM, a private research center based in A Coruña, Spain, has been producing MFC and CNF since 2017 at pilot scale. They have also been involved in the production of lab-scale CNC. CETIM conducts research in advanced lignocellulosic materials for polymers, textiles, adhesives, coatings, papers and other high value-added applications. CETIM produces cellulose nanoparticles from recycled paper, biomass, and other sources.

Contact:  
[Info@cetim.es](mailto:Info@cetim.es)

## **Chinese Academy of Forestry (CAF) (China)**

Wan Shou Shan  
Beijing 100091, China  
+86-10-62888927 62889092  
<http://en.caf.ac.cn/>

Contact:  
[http://en.caf.ac.cn/Contact\\_Us/Contact\\_Us.htm](http://en.caf.ac.cn/Contact_Us/Contact_Us.htm)

## **Chinese Academy of Sciences (CAS) (China)**

52 Sanlihe Rd., Xicheng District,  
Beijing, China (100864)  
86-10-68597521 (day)  
<https://english.cas.cn/>

The Chinese Academy of Sciences is the linchpin of China's drive to explore and harness high technology and the natural sciences for the benefit of China and the world. Comprising a comprehensive research and development network, a merit-based academic society and a system of higher education, CAS brings together scientists and engineers from China and around the world to address both theoretical and applied problems using world-class scientific and management approaches.

Contact:  
[cas\\_en@cas.cn](mailto:cas_en@cas.cn)



## **CIRCOT (India)**

See ICAR-CIRCOT

## **Donghua University (China)**

Songjiang Campus 2999 North Renmin Road 201620  
Yan'an Road Campus: 1882 West Yan'an Road 200051  
Shanghai-ICP-05003365 China  
<http://www.dhu.edu.cn/>

## **Edinburgh Napier University (Scotland)**

Edinburgh, Scotland UK  
United Kingdom  
+44 (0)333 900 6040.  
<http://www.napier.ac.uk/>

## **Empa (Switzerland)**

Ueberlandstrasse 129  
8600 Dübendorf / Switzerland  
+41 58 765 11 11  
<https://www.empa.ch/web/empa/>

An institute of the ETH domain., Empa is the Swiss Federal Laboratories for Materials Testing and Research. Empa operates a MFC pilot plant and conducts applications research with industry partners.

Contact:

<https://www.empa.ch/web/empa/contact-form>

## **FIBIC (Finland)**

Innopoli 3, C-Building  
Vaisalantie 6  
02130 Espoo  
Finland  
[www.fibic.fi](http://www.fibic.fi)

## **Finnish Centre for Nanocellulosic Technologies (Finland)**

P.O. Box 1000, FI-02044  
VTT, Finland  
+358 20 722 111

See VTT.

### **FPInnovations (Canada)**

570 Boulevard St-Jean,  
Pointe-Claire, Quebec H9R 3J9 CANADA  
+1 (514) 630-4100 or [info@fpinnovations.ca](mailto:info@fpinnovations.ca)  
[www.fpinnovations.ca](http://www.fpinnovations.ca)

Specializing in innovative scientific solutions, FPInnovations inaugurated its first CNC research facility with a state-of-the-art pilot plant in 2011. We also produced the first cellulose filaments (CF) in the laboratory and its pilot plant. Today we collaborate with many strategic research alliances, members, and partners. Using the technology developed by our research staff, industry now benefits in developing nanocellulose markets and applications. CelluForce (CNC), Kruger Biomaterials, and Performance Biofilaments (CF) are examples of our collaborations.

Contact:

[stephan.lariviere@fpinnovations.ca](mailto:stephan.lariviere@fpinnovations.ca)

### **Fujian Agriculture and Forestry University (China)**

No. 15 Shangxiadian Road  
Cangshan District  
Fuzhou City, Fujian Province, 350002, China  
<http://english.fafu.edu.cn/>

### **Georgia Institute of Technology (U.S.)**

Renewable Bioproducts Institute  
North Avenue  
Atlanta, GA 30332  
[+1 404.894.2000](tel:+14048942000)  
<https://research.gatech.edu/rbi>

Georgia Tech's Renewable Bioproducts Institute (RBI), formerly the Institute of Paper Science and Technology, champions innovation in converting biomass into value-added products, developing advanced chemical and bio-based refining technologies, and advancing excellence in manufacturing processes.

Contact:

<https://research.gatech.edu/rbi/contactus>

### **Georgia Southern University (U.S.)**

See Herty Advanced Materials Development Center

### **Grenoble Institute of Technology (INP) (France)**

46 avenue Félix Viallet  
38031 Grenoble Cedex 1  
France  
+33 4 76 57 45 00  
[www.grenoble-inp.fr](http://www.grenoble-inp.fr)

## **Herty Advanced Materials Development Center (U.S.)**

110 Brampton Rd.,  
Savannah, Georgia 31408

The Herty Advanced Materials Development Center is an applied research center of Georgia Southern University, with focuses in contract research, development, and manufacturing; and a global leader in technology development. Herty offers laboratory, pilot, and production quantities of nanocellulose and a range of nanocellulose types including nanocrystalline and nanofibrillar morphologies. Applications include pharmaceutical and cosmetics, plastics and film, filled composites, viscosity modifiers, and proppants.

Contact:

<https://research.georgiasouthern.edu/herty/contact-us/>

## **ICAR-CIRCOT (India)**

Adenwala Road, Matunga(East),  
Mumbai-400 019.  
022-24146002

India's Central Institute for Research on Cotton Technology (ICAR-CIRCOT) is one of the premier constituent institutes of the Indian Council of Agricultural Research (ICAR). Research related to nanocellulose includes development of a chemo-mechanical process for preparation of nanocellulose from cotton linters, and development of applications such as barrier films, packaging, and paint.

Contact:

[director.circot@icar.gov.in](mailto:director.circot@icar.gov.in)

## **InnoTech Alberta (Canada)**

250 Karl Clark Road  
Edmonton, BC T6N1E4  
780-427-1956

[www.albertainnovates.ca](http://www.albertainnovates.ca)

InnoTech Alberta is a wholly owned subsidiary of Alberta Innovates. The organization's multidisciplinary, cross-sector teams offer a diversified range of scientific, engineering and technological research and testing capabilities, and the facilities to support technology scale-up. InnoTech Alberta operates a CNC pilot plant that is capable of producing up to 20 kg per week of CNC from a variety of feedstocks.

Contact:

[info@innotechalberta.ca](mailto:info@innotechalberta.ca)

### **Innovatech Labs, LLC (U.S.)**

13805 1st Ave N, Ste 100

Plymouth, MN 55441

888-740-5227

<https://www.innovatechlabs.com/>

Innovatech Labs, a [material testing lab](#), specializes in unique materials analysis. Our analysts work directly with customers to determine which analytical technique(s) will obtain the data necessary to solve the problem at hand. The material testing methods include SEM, FTIR analysis, Auger, DSC, Light Microscopy, Ion Chromatography, GC/MS, Thermogravimetric analysis, and ESCA.

Contact:

[info@innovatechlabs.com](mailto:info@innovatechlabs.com)

### **INRAE (France)**

147, rue de l'Université

75338 Paris Cedex 07 - France

+33(0)1 42 75 90 00

<https://www.inrae.fr/en>

National Research Institute for Agriculture, Food and the Environment

INRAE is France's National Research Institute for Agriculture, Food and Environment. Its mission is to carry out excellent science in order to provide innovative solutions addressing global challenges, notably climate change, biodiversity and food security while at the same time enabling the much needed agroecological, nutritional and energy transition.

Contact:

<https://www.inrae.fr/en/contact>

### **Instituto Tecnológico del Embalaje, Transporte y Logística-ITENE (Spain)**

Parque Tecnológico

C/ Albert Einstein, 1. 46980 PATERNA · VALENCIA

+34 96 182 00 00

<http://www.itene.com/en>

The Additives and Raw Materials Research Unit has expertise in research & development of cellulose nanomaterials for packaging applications. The MFC Pilot Plant can produce MFC from different sources (agricultural wastes, recycled fibres, food wastes, annual plants or common trees). MFC production is 50kg/day of aqueous suspensions (up to 3 wt%). ITENE can also produce other cellulose nanoadditives (CNC and CNF) and can be functionalized for target applications such as barrier coatings for flexible packaging or reinforcements for biocomposites.

Contact:

Dr. Miriam Gallur

[miriam.gallur@itene.com](mailto:miriam.gallur@itene.com)

### **Korea Forest Research Institute (South Korea)**

Korea Forest Service  
Government Complex-Daejeon, Bldg. 1  
189 Cheongsa-ro, Seo-gu, Daejeon  
Republic of Korea 35208  
+82-42-481-4080  
[www.forest.go.kr](http://www.forest.go.kr)

### **KTH Royal Institute of Technology (Sweden)**

Valhallavägen 79  
100 44 Stockholm  
Sweden  
+46 8 790 60 00  
<https://www.kth.se/>

### **KU Leuven (Belgium)**

Oude Markt 13 - bus 5005  
3000 Leuven  
Belgium  
+32 16 324010  
<http://www.kuleuven.be/english/>

### **Kyoto University (Japan)**

Yoshidahonmachi, Sakyo Ward,  
Kyoto, Kyoto Prefecture 606-8501  
+81 75-753-7531  
<http://www.kyoto-u.ac.jp/en>

See RISH Research Institute for Sustainable Humansphere in the Producers Section.

### **Lakehead University, Biorefining Research Institute (BRI) (Canada)**

955 Oliver Rd, Thunder Bay, Ontario  
P7B 5E1, Canada  
<https://www.lakeheadu.ca/centre/bri>

BRI is committed to the comprehensive utilization of lignocellulosic biomass, aiming for sustainable production of high value bioproducts. BRI strategically integrates diverse conversion platforms to achieve cost-effectiveness and environmental sustainability, ensuring the optimal valorization of biomaterials. Ongoing research projects encompass the development of bio-inspired nanomaterials, including cellulose nanomaterials tailored for sustainable and multifunctional nanocomposite applications.

Contact:

P: (807) 343-8110 EXT 8863

E: [admin.bri@lakeheadu.ca](mailto:admin.bri@lakeheadu.ca)

### **Luleå University of Technology (LTU) (Sweden)**

Universitetsområdet, Porsön  
971 87 Luleå  
Sweden  
+46 920 49 10 00  
[www.ltu.se](http://www.ltu.se)

### **McGill University (Canada)**

845 Rue Sherbrooke Ouest  
Montreal, Quebec, H3A 0G4  
Canada  
+1 514 398 4455  
[www.mcgill.ca](http://www.mcgill.ca)

### **McMaster University (Canada)**

1280 Main Street West  
Hamilton, Ontario L8S 4L8  
Canada  
+1 905 525 9140  
<http://www.mcmaster.ca/>

### **Minho University (Portugal)**

Biological Engineering Department  
Campus of Gualtar, 4710-057 Braga  
Portugal  
+351 253604418  
[Centre of Biological Engineering / Centro de Engenharia Biológica \(uminho.pt\)](http://www.uminho.pt)

The Functional Carbohydrates Group at the Center of Biological Engineering investigates the use of polysaccharides for various applications, including Bacterial NanoCellulose production, processing and application: fermentation (static & stirred culture), production scale up, dry formulations for Pickering emulsions, applications in textiles, biomedicine and food.

Contact:  
[fmgama@deb.uminho.pt](mailto:fmgama@deb.uminho.pt)

### **Monash University (Australia)**

15 Alliance Lane  
Clayton 3800  
Australia  
+61 3 99053456  
<https://www.monash.edu/>

See BioPRIA.

### **Nanjing Forestry University (China)**

No. 159 Lonpan Road  
Nanjing 210037  
Jiangsu  
P.R. China  
+86-25-85427131 / 85427132  
<https://eng.njfu.edu.cn/>

### **National Center for Nanoscience and Technology (NCNST) (China)**

No. 11 ZhongGuanCun BeiYiTiao  
100190 Beijing, P.R. China  
+86 10-82545545  
<http://english.nanoctr.cas.cn/>

### **National Institute for Nanotechnology (NINT) (Canada)**

11421 Saskatchewan Dr.  
Edmonton, Alberta T6G 2M9  
Canada  
+1 780 641 1600  
[www.nrc-cnrc.gc.ca](http://www.nrc-cnrc.gc.ca)

### **National Institute of Standards and Technology (NIST) (U.S.)**

100 Bureau Drive, Stop 1000  
Gaithersburg, MD 20899-1000  
U.S.A.  
+1 301 975 2300  
[www.nist.gov](http://www.nist.gov)

### **National Research Council of Canada (NRC) (Canada)**

1200 Montreal Road  
Ottawa, Ontario K1A 0R6  
Canada  
613-993-9101  
<http://www.nrc-cnrc.gc.ca/eng/index.html>

## **North Carolina State University (U.S.)**

Department of Forest Biomaterials

2820 Faucette Drive, CB 8005

Raleigh 27695 NC, USA

<https://faculty.cnr.ncsu.edu/nathielavoine>

Lavoine research group provides technical and consulting services on research & development of cellulose nanomaterials. We can produce aqueous suspensions (up to 5 wt%) of cellulose nanocrystals and cellulose nanofibrils/microfibrils, from different (ligno)cellulosic sources. Our lab has capabilities of producing few milliliters to liters of both materials, with different surface functionalities and performance for target applications and specifications. Also open to research/industrial partnerships and collaborations.

Contact:

Dr. Nathalie Lavoine, [nmlavoine@ncsu.edu](mailto:nmlavoine@ncsu.edu)

## **Northeast Forestry University (China)**

No. 26 Hexing Road, Xiangfang District

Harbin, 150040

P.R. China

<http://en.nefu.edu.cn/>

## **Oregon State University (U.S.)**

College of Forestry

Peavey Hall

Corvallis, OR 97331

U.S.A.

+1 514 737 4952

[www.oregonstate.edu](http://www.oregonstate.edu)

## **Paper and Fibre Research Institute (Norway)**

Høgskoleringen 6b, NO-7491

Trondheim

+47 73 60 50 65

<http://www.pfi.no/>

## **Process Development Center (U.S.)**

See University of Maine



## **Purdue University (U.S.)**

610 Purdue Mall  
West Lafayette, Indiana 47907  
U.S.A.  
+1 765 494 4600  
<https://www.purdue.edu/>

The Youngblood Group at the School of Material Engineering investigates nanotechnology, surface science, advanced processing, and biomaterials. Sustainable Nanotechnology includes CNC and CNF processing: Fiber Spinning, Roll to Roll Continuous Fabrication, and Nanocomposites. CNC has also been demonstrated as an effective additive in cementitious materials, reducing stress while increasing degree of hydration at very low dosages. This technology is being commercialized under license.

Contact:  
[jpyoungb@purdue.edu](mailto:jpyoungb@purdue.edu)

## **Renewable Bioproducts Institute (U.S.)**

See Georgia Institute of Technology

## **Research Council of Norway (Norway)**

Stensberggata 26  
Oslo, Norway  
+47 22 03 70 00  
[www.forskningsradet.no](http://www.forskningsradet.no)

## **Research Institute of Forestry New Technology (China)**

<http://en.caf.ac.cn/Organizational/ij7.shtml>

See Chinese Academy of Forestry (CAF).

## **Research Institute of Wood Industry, Chinese Academy of Forestry (CRIWI) (China)**

Haidian District, Beijing 100091, China.  
+86-10-62889410  
<http://criwi.caf.ac.cn/>

## **RISE Research Institutes of Sweden AB (Sweden)**

Sven Hultins plats 5, 412 58,

Gothenburg, Sweden

010-516 50 00

<https://www.ri.se/en>

RISE is Sweden's research institute and innovation partner. RISE Innventia, an early leader in the development of MFC, reduced energy usage in producing MFC through six generations of development, including enzymatic pretreatment. RISE operates a 100 kg/day MFC pilot plant at Innventia and a mobile demonstration plant for MFC trials at mills around the world. The mobile demo plant is able to produce highly refined fiber (HF), highly refined enzyme treated fiber (HFE) or MFC at the rate of 100 kg of dry product per hour.

Contact:

<https://www.ri.se/en/about-rise/contact-us>

## **RISH Research Institute for Sustainable Humanosphere (Japan)**

Kyoto University.

Gokasho, Uji City, Kyoto Prefecture, Japan. 611-0011

+774-38-3346

<https://www.rish.kyoto-u.ac.jp/?lang=en>

The Research Institute for Sustainable Humanosphere (RISH) at Kyoto University is a leader in cellulose nanofibril research. Professor Hiroyuki Yano of RISH was the first in Japan to become engaged in the research of cellulose nanofibers that form the cell walls in plants, beginning in 1996. The Kyoto Process is based on the "Pulp Direct-Kneading Method. RISH has a pilot plant with capacity of 1 tonne per year of thermoplastic resins with 10 wt. % CNF. Seiko PMC constructed a pilot plant based on this Kyoto process in 2013, and Nippon Paper did so in 2017.

Contact:

Prof. Hiroyuki Yano

Lab. of Active Bio-based Materials

Research Institute for Sustainable Humanosphere, Kyoto University

Uji, Kyoto 611-0011

[yano@rish.kyoto-u.ac.jp](mailto:yano@rish.kyoto-u.ac.jp)

## **Sichuan University (China)**

No. 24 South, Section 1,

Yihuan Road, Chengdu 610065

P.R. China

<http://www.scu.edu.cn/en/>

## **South China University of Technology (SCUT) (China)**

Guangzhou International Campus  
777 Xingye Avenue East, Panyu District Guangzhou,  
Guangdong, P.R. China  
Post Code:511442  
+86-20-81181647  
[http://www2.scut.edu.cn/gzic\\_en/](http://www2.scut.edu.cn/gzic_en/)

SCUT Guangzhou International Campus is a state-level campus jointly developed by the Ministry of Education, the People's Government of Guangdong Province, the People's Government of Guangzhou Municipality and South China University of Technology (SCUT). Research with nanocellulose includes preparation of CNC and CNF as well as development of applications.

Contact:  
[global@scut.edu.cn](mailto:global@scut.edu.cn)

## **TAPPI International Nanotechnology Division (U.S.)**

15 Technology Parkway South  
Peachtree Corners, GA 30092  
(770) 446-1400  
<https://www.tappinano.org/>

**Members of TAPPI's Nano Division strive to advance the responsible use and production of renewable and sustainable nanomaterials. TAPPI Nano has established itself as the preeminent conference on nanotechnology related to renewable nanomaterials. The 2024 TAPPI Nanotechnology Conference will be held in Atlanta, GA, from June 10th to 14th, 2024.**

Contact:  
Robert Davis, Division Manager for Nanotechnology  
[rdavis@tappi.org](mailto:rdavis@tappi.org)

## **Technikum Laubholz (Germany)**

Bahnhofstraße 41 + 52  
73033 Göppingen  
Deutschland  
+49 1525 320 31 11  
<https://technikumlaubholz.de/en/>

The Technikum Laubholz is the first independent non-university institute for leading-edge research in Baden-Württemberg with an exclusive focus on the development of all processes and products relating to wood as a renewable raw material. Technikum Laubholz is planning and building a plant for the production of nanocellulose from beech wood fibers using fully automated technology to optimize the entire process workflow with the help of artificial intelligence. Called KlickBio, the project is part of the ERDF's Innovation and Energy Transition program.

Contact  
<https://technikumlaubholz.de/en/contact/>

## **Tianjin University of Science and Technology (China)**

No. 29, 13th Avenue  
Tianjin Economic and Technological Development Area (TEDA)  
Tianjin, China  
300457  
<http://www.xn--v5zvnq1bxbvs.com/gywm>

## **University of Alberta (Canada)**

116 St. and 85 Ave.,  
Edmonton, Alberta, T6G 2R3  
Canada  
<https://www.ualberta.ca/>

## **University of British Columbia (Canada)**

BioProducts Institute  
2385 East Mall  
Vancouver, BC Canada V6T 1Z4  
<https://bpi.ubc.ca/>

The University of British Columbia BioProducts Institute (BPI) is an innovative ecosystem of high-impact fundamental and applied researchers working on solutions to today's climate and environmental challenges. Research themes center around biocatalytic transformation and engineering of biomass, bio-nanoparticle enabled materials, bio-based polymers and carbon materials, and biorefinery and biofuels systems.

Contact:  
<https://bpi.ubc.ca/contact-us>

## **University of Grenoble Alpes (France)**

621 avenue Centrale  
38400 Saint-Martin-d'Hères  
+33 (0)4 57 42 21 42  
<https://www.univ-grenoble-alpes.fr/english/>

Contact:  
[Contact us](#)

## **University of Helsinki (Finland)**

P.O. Box 4 (Yliopistonkatu 3) 00014  
+358 (0) 2941 911  
<https://www.helsinki.fi/en/>

## **University of Maine (U.S.)**

The Process Development Center  
5737 Jenness Hall  
Orono, ME 04469  
207-581-2237  
<https://umaine.edu/pdc/>

The Process Development Center (PDC) offers a broad range of technical services and resources. The University of Maine (UMaine) Nanomaterial Pilot Plant opened in 2012 at the PDC and is a joint project with the US Forest Service. The pilot plant has capacity for 1 ton per day of CNF and is the largest CNF plant in the US. The UMaine PDC supplies cellulose nanofibrils (CNF) and cellulose nanocrystals (CNC) to academic, public, and private research groups interested in evaluating and developing applications for these materials.

Contact:  
[umaine.pdc@maine.edu](mailto:umaine.pdc@maine.edu)

## **University of Tehran (Iran)**

16th Azar St., Enghelab Sq.  
Tehran, Iran  
+98 21 61113411  
<http://ut.ac.ir/en>

## **University of Tennessee (U.S.)**

Knoxville, Tennessee 37996  
865-974-1000  
<https://www.utk.edu/>

The UTK Center for Renewable Carbon conducts research on nanocellulose from pulp, agricultural sources and recycled cellulose. Research areas include MFC, CNF, and CNC, as well as nanocellulose composites, foams, films, coatings, suspensions and viscosity modifiers, and water absorbents. The University of Tennessee and Battelle Memorial Institute co-manage [Oak Ridge National](#) Laboratory.

Contact: Siqun Wang  
[swang@utk.edu](mailto:swang@utk.edu)

## **University of Tokyo (Japan)**

7-3-1 Hongo, Bunkyo  
Tokyo 113-8654, Japan  
+81 3 3812 2111  
<http://www.u-tokyo.ac.jp>

The University of Tokyo was established in 1877 as the first national university in Japan. The Department of Biomaterial Sciences conducts extensive research in nanocellulose characterization, preparation, performance, and applications under the direction of Dr. Akira Isogai.

Contact:  
[aisogai@mail.ecc.u-tokyo.ac.jp](mailto:aisogai@mail.ecc.u-tokyo.ac.jp)

### **University of Toronto (Canada)**

Centre for Biocomposites and Biomaterials Processing

33 Willcocks Street

Toronto, Ontario M5S 3B3

Canada

1-416-978-5480

<http://forestry.utoronto.ca/centre-for-biocomposites-and-biomaterials-processing/>

### **University of Waterloo (Canada)**

200 University Avenue West

Waterloo, Ontario N2L 3G1

Canada

+1 519 888 4567

[www.uwaterloo.ca/](http://www.uwaterloo.ca/)

### **USDA Forest Service, Forest Products Laboratory (U.S.)**

One Gifford Pinchot Drive

Madison, WI 53726

608-231-9200

<https://www.fpl.fs.usda.gov/>

In 1910, the US Forest Service, Forest Products Laboratory (FPL) was established in Madison, Wisconsin. In August 2012, the US Department of Agriculture (USDA) Forest Service Forest Products Laboratory (FPL) unveiled a \$1.7 million production facility for renewable, forest-based nanomaterials. This facility was the first of its kind in the United States. The FPL pilot plant produces CNC and TEMPO-based CNF with weekly production capacity of 30 kg or 5 kg, respectively.

Contact:

<https://www.fpl.fs.usda.gov/contact/index.php>

### **Virginia Polytechnic Institute and State University (U.S.)**

800 Washington Street, SW

Blacksburg, VA 24061

U.S.A.

540-231-6000

<https://vt.edu/>

## **VTT Technical Research Centre of Finland**

PO Box 1000  
FI-02150 VTT  
+358 20 722 111  
[www.vtt.fi](http://www.vtt.fi)

VTT, a non-profit research organization, can make various MFC and CNF grades for application testing. These grades can be produced from customer's raw materials with varying degrees of fibrillation (coarse, medium, fine fibre size). VTT can also produce specific aseptic grades for cosmetic and pharmaceutical applications. VTT produces tailor-made samples for R&D purposes from lab to pilot scale using standard equipment such as Masuko grinders and microfluidizers, unmodified, chemically modified, and enzymatically aided, up to 20 kg/day.

Contact:  
Erkki Hellen  
[erkki.hellen@vtt.fi](mailto:erkki.hellen@vtt.fi)  
+358 20 722 7422

## **Wuhan University (China)**

Wuhan, Hubei Province  
P.R. China 430072  
<http://en.whu.edu.cn/index.htm>

The TAPPI Nanotechnology Division is comprised of scientists, technical professionals, students and other stakeholders who work to advance the research, development, and deployment of renewable nanomaterials to help meet the materials needs of people and society, share and disseminate knowledge and information on responsible production, use, and disposal of renewable nanomaterials, and advance the science and technology supporting the production, modification, and end user applications for renewable nanomaterials.



Each year, the Division hosts the International Conference on Nanotechnology for Renewable Materials, which has established itself as the preeminent technical conference on the production, research, development, and application of cellulose nanomaterials and other renewable materials. To engage this international community, and taking attendees to where the state-of-the-art research and development is happening, the site of NANO conference alternates between Asia, Canada, Europe, Scandinavia, and the U.S. Learn more about the NANO Conference at [conference.tappinano.org](http://conference.tappinano.org).

## Get Involved

### Nano Division Leadership Council

Governs the Nanotechnology Division and is comprised of the Chair, Vice-Chair, and Secretary.

### Nano Conference Planning Committee

This committee plans the annual International Conference on Nanotechnology for Renewable Materials

### End Users Committee

A forum for end-users of renewable nanomaterials (cellulosic, chitin, hemicellulose, lignin, starch, etc) to share industry-wide needs to support the commercial development of these materials.

### Research Committee

A forum for researchers to exchange information and collaborate for the advancement of Science and engineering that is needed to address industry-wide needs in commercial development of renewable materials.

### Student Committee

A forum for students to network, learn about resources. Dedicated to providing a global network that connects students and young professionals around the world, facilitating knowledge exchange, providing useful tools, advice, and encouragement, so that students pursue careers that advance the use of renewable and sustainable nanomaterials.

### Renewable Nanomaterials Producers Committee

This committee focuses on industry-wide and pre-competitive issues, including: Identifying research challenges that need to be addressed from a fundamental perspective; Identifying areas where industry standards should be given greater focus and support; Identify white papers or other publications that are needed to educate the public or material users; Identifying white papers, other publications, or technical presentations on specific research areas that would benefit producers.

### Webinar Committee

A platform from which the latest research, commercial developments and educational tutorials in the use of renewable and sustainable nanomaterials can be presented to our community.

**Open to all TAPPI members, these committees are an excellent way to further your role in nanotechnology. Learn more by scanning this QR Code.**

**Learn More.**



**Open, Aim and Tap**

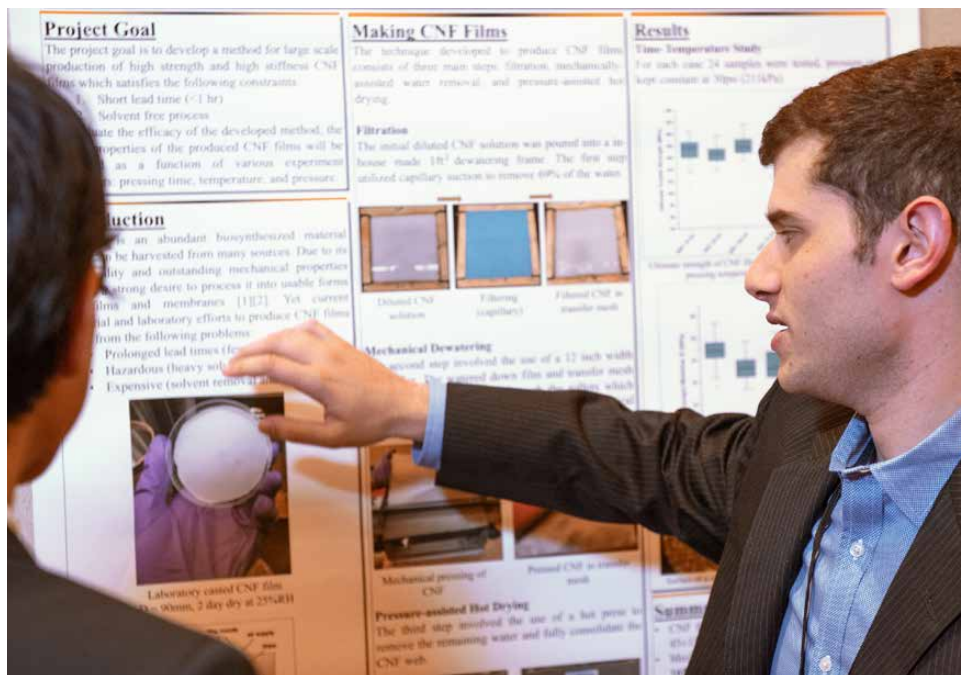


***“At the blistering pace at which Cellulose Nanomaterials is advancing in research, production capacity, and industrial applications, it is critical to have access to people making this happen. Being part of the TAPPI Nano Division it gives me this access, and thus, an opportunity to expand my network with the people and industries relevant in Cellulose Nanomaterials development.”***

**– Robert J. Moon,  
 USDA Forest Service,  
 Former Nanotechnology  
 Division Chair**

**BENEFITS AND RESOURCES:**

- ▶ Build relationships, network, and collaborate with industry leaders and technical experts from across the country, both in person and online.
- ▶ Participate in the development of content for the annual Nanotechnology conference; develop and publish Technical Information Papers (TIPs) and industry publications.
- ▶ Access to free webinars, archived conference proceedings, Paper 360<sup>o</sup>, TAPPI Journal, and articles from TAPPI.org, as well as the industry’s largest eLibrary of 25,000+ papers, articles, reports and technical documents.
- ▶ Get member discounts on a portfolio of highly-valued learning tools; technical conferences with continuing education credits, face-to-face and online courses, certificates, and Standards and Technical Information Papers (TIPs).



**Division Manager:**  
 Robert Davis  
 RDavis@tappi.org • 770.209.7279

**Learn More.**



**Open, Aim and Tap**

# BioBased Markets

[www.biobasedmarkets.com](http://www.biobasedmarkets.com)

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