Nippon Paper Industries

Company profile

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Company description

Nippon Paper Group, Inc. is a company established jointly by Nippon Paper Industries Co., Ltd. and Daishowa Paper Manufacturing Co., Ltd. The Company is a leading player in paper and pulp products.

CNF production history

April 2015: the company announced they had succeeded in the practical realization of functional sheets using TEMPO oxidized CNF.

October 2015: the company launch the "Hada Care Acty" series adult diapers incorporating cellulose nanofiber deodorant sheets. The company process uses TEMPO catalytic oxidation method, that allows for high concentrations of metal ions and metallic nanoparticles to be attached to the surface of CNF. The company manufacture sheets of CNF incorporating a large amount of metal ions that generate deodorant and antibacterial effects. NPI’s subsidiary, Nippon Paper Crecia Co., commercialize, adult diapers utilizing CNF.

December 2016: the company announce a demonstration plant at Fuji Mill (Fuji, Shizuoka) to promote practical applications of CNF-reinforced resin. The annual production of CNF-reinforced resin will be more than 10 tons. Samples will be provided for various area of industries, including automobiles, building materials, and home appliances.

April 2017: the company establish CNF production facility at the Ishinomaki mill. The facility is the world's largest for CNF with a capacity of 500 tons per year of TEMPO ((2,2,6,6-Tetramethylpiperidin-1-yl)oxy) oxidized CNF.

July 2017: the company announce the completion of the construction of a demonstration plant for cellulose nanofiber (CNF)-reinforced plastic (CNFRP) at the Fuji Mill (Fuji, Shizuoka). The facility produces CNFRPs by mixing CNF and plastics.

Figure 99: Hydrophobization facilities for raw pulp. Image: Nippon Paper Crecia Co.
September 2017: establish a production plant for CM-CNF for additive applications such as foods and cosmetics at the Gotsu Mill from September 2017. Parts of this capacity is used internally as a deodorizer and odour reducer (antimicrobial) in adult diapers.

February 2018: announce plan to build a demonstration plant at Fuji mill in Japan to drive the development of practical applications of "MinerPa®": a set of new functional materials created by compounding particulate minerals and wood pulp (cellulose fibers) using the Company’s pulp-modification technologies.

October 2018: complete "MinerPa®" demonstration plant with an annual production capacity of more than 450 tons.

December 2018: CELLENPIA® used by "Tago no Tsuki" for its new dorayaki (pancakes stuffed with sweet red bean paste)

March 2019: announces the construction of a new facility for the functional cellulose product carboxymethyl cellulose (CMC, product name: "SUNROSE®") at the Gotsu Mill (Gotsu City, Shimane Prefecture).

April 2019: Cellenpia® adopted for the main product line of Sakaneya LLC. Cellenpia® is used for "Sakura Crepe" and "Nama Dora".

October 2019: TEMPO oxidized CNF "Cellenpia®" used in the high performance tire "ENASAVE NEXT III" released by Sumitomo Rubber Industries, Ltd.

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TEMPO oxidized CNF process
The TEMPO oxidized CNF process was developed by the research group of Prof. Akira Isogai of the University of Tokyo. Carboxymethylated CNF can also be produced. With this method, pulp is easily defibrated and nanofiber with a uniform width can be created.

Wood pulp $\rightarrow$ TEMPO oxidation, Carboxymethylation, Mechanical treatment.

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| • Wood pulp.  | • TEMPO oxidation, Carboxymethylation, Mechanical treatment.  
• High concentrations of metal ions and metallic nanoparticles with antibacterial and deodorizing effect are attached to the surface of the CNF sheet.  | • Demonstration samples in large quantities sent to materials suppliers, converters and end users.  
• Possess in house application and production know how. | University of Tokyo. | • Direct sales to materials suppliers, converters and OEMs.  
• Direct sales to market. |

Figure 101. Nippon Paper CNF production process.

| Products | The company produces TEMPO-catalyzed CNF, as well as carboxymethylated CNF and CNF composites. |