

# Goodbye petroleum, hello bio

Bio-based multilayer transparent barrier films are now reality.

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Four key players in the bioplastics industry - Eurotech Extrusion Machinery, NatureWorks, Nippon Gohsei and Sukano - have successfully processed a multilayer transparent bio-based barrier film. This allows packaging manufacturers to count coextruded film structure as a potential replacement for conventional fossil fuel-based structures in dry food packaging.

Schindellegi, Switzerland, June 13, 2018 - Bioplastics are already part of our everyday life. Driven by high consumer demand and market innovations in advanced technical properties and functionalities, companies have already taken some major steps towards the transformation to a bio-based and circular economy. The goal is to decrease environmental impact concerns by decoupling packaging material from fossil resources, changing consumption patterns and reimagining packaging designs.



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Flexible multilayer plastic packaging design remains a major challenge, as most conventional multilayer films are neither recyclable nor compostable. As of today there is a lack of recyclability for this kind of packaging that still makes up over 75 % of the food industry usage.

Understanding this gap in the market, four key players in the bioplastics industry have joined together to find a solution. Eurotech Extrusion Machinery, NatureWorks, Nippon Gohsei and Sukano have now successfully processed a multilayer transparent bio-based barrier film.



*Driven by expertise*

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Ingeo resin processed into a film is already used in many types of flexible packaging. Using Ingeo provides for a reduced carbon footprint, as well as compostability as an end of life option. For higher gas barrier requirements, a coating or a metallization surface treatment of the film is typically required. However, the need for this coating or metallization can be eliminated through the use of a barrier polymer to produce a coextruded structure. This provides an additional, new option for packing foods which require an extended shelf life, while still offering clarity and compostability.

The coex film processed at Eurotech used a K5A 5 layer blown film lab machine in a configuration using 2 extruders 25 mm., and 3 extruders 20 mm., including the die lip of 100 mm. diameter and 1.4 mm gap.

The total film thicknesses of 45 microns, 280 mm width, contains Ingeo PLA 4043D from NatureWorks and is used in the inner A layer, with an outer bubble layer E including SUKANO® masterbatches processing aids. These PLA-based SUKANO® masterbatches were specifically designed for this application. The tie layers use BTR8002P and the barrier layer uses G-polymer both from Nippon Gohsei. This combination of formulation and process conditions yielded a stable bubble, excellent film transparency, and good roll quality.

Testing showed that the use of SUKANO® masterbatches offered increased melt strength, and therefore better processability, good transparency and better adhesion during sealing. Mechanical properties were also maintained. As an additional benefit each material used in the film has either been tested and certified or assessed to be biodegradable and industrially compostable according to European norm EN 13432. Less film sticking was managed via the use of slip agent bio-based masterbatches, which increased the processing window and ensured good processability conditions and a lower COF, therefore conferring better film properties for secondary fabrication steps.

For the barrier layer Nichigo G-Polymer™, the World's first Extrudable High Barrier Amorphous Vinyl Alcohol Resin, was used. This provided key benefits in packaging, such as excellent gas and aroma barrier and high transparency, while supporting compostability and recyclability properties of the final film produced. Outstanding water solubility for solution coating barrier applications and extrudability were also evident. The G-Polymer barrier is so effective that it can replace Alu-foil in many packaging applications. And even at 4mm thickness of mono-layer G-Polymer, transparency was glass-like. The tie layer BTR8002P gives high adhesion between layers, maintaining high transparency.



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		Bio-Barrier with Nichigo G-Polymer™	Existing Barrier (PP/EVOH/PP)
Barrier Layer [µm]		13	12
Humidity in Barrier [%]		26	4
WVTR [g/capsule day]	38°C 90%RH	0.059	0.007
OTR [cm³/capsule day Air]	23°C Inner Dry, Outer 50%RH	0.0002	0.0008

The achievement of this multilayer transparent bio-based barrier film allows packaging manufacturers to count multilayer film structure as a potential replacement for conventional fossil fuel-based structures in dry food packaging such as lid films for coffee capsules or lidding films for cups and trays, flow packs, trays for snacks, and biscuits packages. And it may even extend to certain humid foods such as ham, fish, and meat when used with proper packaging design.

**About Sukano**

Sukano is a world leader in the development and production of additive and colour masterbatches and compounds for polyester and specialty resins. The company is driven by expertise – Sukano focuses its technical knowledge on developing innovative masterbatches for oil and bio-based polymers that can be used for applications such as thin and thick films, bottles and containers, fibers, filaments, and sheets.

Founded in 1988, Sukano developed the state-of-the-art, market reference slip/antiblock additive masterbatch for PET applications. Headquartered in Switzerland, it is a family-owned business with a global distribution network and production facilities in Europe, the Middle-East & Africa, the Americas and Asia Pacific.

Providing unparalleled service, knowhow, and quality to its customers worldwide, Sukano is the global partner of choice for plastic converters and brand owners to develop their innovative products and highly specialized solutions.

For more information, visit [www.sukano.com](http://www.sukano.com).

**About Nippon Gohsei**

The Nippon Synthetic Chemical Industry Co., Ltd. (NIPPON GOHSEI) succeeded in the industrialization of Japan's first synthesis of acetic acid in 1927. Since then, NIPPON GOHSEI has been making full use of its unique development capabilities and latest technology and responding to the needs of the times and the requirements of customers. It has been aiming at creating new value based on our proprietary expertise and the partnership with our customers



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**About Eurotech Extrusion Machinery**

Eurotech Extrusion Machinery srl offers, since 1999, complete solution and systems dedicated to laboratories and research and development departments of companies specialized in production, manufacturing and processing of thermoplastic materials, including also complete lines for industrial production, keeping small/medium scale machines.

Application experience, engineering and design, knowledge of machines and processes, based on the real 30-year experience of our technicians, makes EUROTECH EXTRUSION MACHINERY a reliable partner, with the target to give the customer all the solutions to meet their needs. Constant innovation to always achieve a high technology level is our main goal.

**About NatureWorks**

NatureWorks is an advanced materials company offering a broad portfolio of renewably sourced polymers and chemicals to the packaging, polymers, fibers, and chemicals markets. With performance and economics that compete with oil-based plastics and fibers, naturally advanced [Ingeo™](#) polymers are valued for their unique functional properties and used in a range of products from coffee capsules and electronics to diapers and wipes. Creating performance through chemistry, [Vercet™](#) lactide-based solutions help innovators realize significant, measurable performance and cost advantages in products such as C.A.S.E. (coatings, adhesives, sealants, and elastomers), toners, and surfactants. NatureWorks is jointly owned by Thailand's largest and ASEAN's leading integrated petrochemical and refining company, PTT Global Chemical, and Cargill, which provides food, agriculture, financial and industrial products and services to the world. [www.natureworkslc.com](http://www.natureworkslc.com); follow NatureWorks on Twitter [@natureworks](https://twitter.com/natureworks)