

Sustainable Product Innovation



Indovinya Segment [formerly Integrated Oxides And Derivatives (IOD)]

OXIMULSION® 9000 APE-FREE SURFACTANTS SOLUTION FOR WATERBORNE COATINGS



The OXIMULSION[®] 9000 line facilitates the *formulation of a stable alkyd emulsion, providing the opportunity to completely substitute solvents with water,* leading to the development of *water-based enamels used in architectural paints and coatings.*

This product offers an *excellent level of gloss and general proprieties in the final application*, comparable to traditional solvent-borne enamels. At a *great cost-benefit*, *water-based enamels eliminate VOC (volatile organic compound) emissions and the strong odors associated with solvent-based alternatives*.





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OXISENSE® H 1000



To develop cleaning products, one must consider the challenge of using ingredients that guarantee a stable system, which is often achieved through hydrotropes. \

Through our global business division, Indovinya, we invested in the development of OXISENSE® H 1000, a plant-based hydrotrope that is 100% renewable. This hydrotrope allows for cold processing, generating energy savings while also being free of phosphates and any other phosphorus derivative, which prevents the eutrophication of water bodies such as rivers and lakes.

Furthermore, 100% of this product's ingredients are active, allowing it to be supplied in smaller packaging, reducing the consumption of packaging materials such as plastic, thus ensuring a more sustainable production chain, meeting marketing, environmental, and social demands.



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Surfom[®] 9115 – A Potent Solution For Managing Water Scarcity In Soil



Soil health is a significant concern in modern agricultural practices, including adopting improved agronomic practices, using lower volumes of more efficient crop protection products, and directly managing the soil.

Introduced in 2023, SURFOM[®] 9115 not only helps farmers overcome drought periods but also reduces water consumption in irrigated areas. It is biodegradable and biocompatible, enhancing water penetration in hydrophobic soils, improving horizontal water distribution in the soil profile, and retaining water near the roots for longer periods.

Available from 2024, SURFOM[®] 5015 with Renewable EO has great potential for reducing value chain emissions – especially our customers' Scope 3 emissions. The product also has a blend, SURFOM[®] 8963, that works as a high load herbicide formulation, allowing reductions in dosage in the field and in packaging usage. This represents a reduction of 40.2% of CO₂e emissions in logistics and reverse logistics in the agro chain.



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SURFOM ULV 8



SURFOM ULV 8, an *outstanding choice for Drone Applications*. By increasing AI *deposition and droplet coverage*, SURFOM ULV 8 is a good tool to improve the performance of pesticides.

SURFOM ULV 8 is a non-ionic surfactant blend to optimize drone based crop protection product applications, primarily to enhance the deposition of active ingredients and droplet coverage. This application method reduces water usage and waste from packaging and raw materials, making it an eco-friendly choice for farmers.

SURFOM ULV 8 is a good tool to *increase the coverage of spray on crop leaves*. By *reducing the surface tension*, it contributes to *decrease the active ingredient loss and allows a better absorption* of it by the plant.

In addition to that, SURFOM ULV 8 has presented excellent performance in lab tests; presenting low dynamic surface tension, low wetting time, great spreading behavior in different surfaces, contributing to increase droplet deposition and leaf coverage, what might reduce droplet bouncing and improve pesticide deposition on leaves.

For more information

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Indovinya Segment [formerly Integrated Oxides And Derivatives (IOD)]

ULTRASOLVE® H line FLEXOGRAPHIC PRINTING INKS



Ultrasolve[®] H was developed by IVL for application in flexographic printing inks, and was endorsed by several customers in Brazil, Peru, Colombia, Mexico, Argentina, South Africa, India, and Australia.

Ultrasolve[®] H offers high efficiency as a solvent retardant during application in printing inks where less solvent is required compared to traditional solvent retardants. It is a solvent with both low toxicity and odor, promotes low retention in the application of flexible plastic packaging, and is also in accordance with the main regulations of the food packaging market.

In 2022, sales revenues for printing inks reached US\$1.75 million, with a total volume of 642 tons.



Combined PET (CPET) Segment

World's First Sustainable Monolayer PET Sparkling Wine Bottle



In 2023, the world's first sustainable monolayer PET sparkling wine bottle was introduced through a collaboration involving SIPA's Packaging Development Team and made from Indorama Ventures original bottle resin and OxyClear[®] barrier. The new bottle was awarded top prize in the 2023 Best Packaging contest at Milan Design Week. The bottle offers the same look, functionality, and feel of a traditional glass sparkling wine bottle.

Key features of the world's first sustainable, monolayer PET sparkling wine bottle:

- *Helped the European wine industry address a glass shortage* due to supply chain, energy, and raw material challenges, which saw the average cost of a glass wine bottle increase 23% from April 2020 to April 2023.
- The award-winning PET packaging solution for sparkling wine provides brands with a fully recyclable option, maximizes logistics efficiencies, minimizes handling risks, runs on existing glass-filling lines, and has a lower carbon footprint compared to conventional options.
- OxyClear[®] PET wine bottles offer the same benefits and functionality as glass after 24 months in storage at 15 °C.



Combined PET (CPET) Segment

Polyclear® Preserve PET 2222 : Modified Pet Resin With A Higher Glass Transition Temperature

polyclear

This new product, launched in 2022, can *provide a higher heat deflection temperature to containers* compared to standard PET.

Target application: Thermoformed trays for sterilized medical packaging.

Containers made from Polyclear[®] Preserve PET 2222:

- are lightweight and shatterproof
- can be recycled with standard PET
- exhibit *excellent clarity* in combination with superior dimensional stability preventing shrinkage and expansion at higher application temperatures
- provide an additional UV-light barrier over standard PET
- *comply with the Federal Food, Drug, and Cosmetic Act* for certain food contact applications



Combined PET (CPET) Segment

DEJA™ CARBON NEUTRAL : Low - Carbon Food-grade Pellet



Our PTA & IPA comes from co-location plants and our rPET is sourced locally, reducing carbon emissions

Vertical integration

Methane produced during water treatment is used to power our onsite boiler. Co2 byproduct of production is used by a neighbouring plant to carbonate beverages.

Water transport

90% of our MEG (Mono-Ethylene Glycol) supplies are transported to our facilities by barge from local sources.

South pole Verified carbon offsets

In partnership with South Pole, we offset our unavoidable carbon emissions by supporting verified carbon emissions reduction projects

* Deja Carbon Neutral is a proposition with neutralized raw material emissions, from cradle to our plant gates

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Produced to have a low carbon impact, our Deja Carbon Neutral pellet* is designed to perform while helping achieve sustainability targets and supports the UN Sustainable Development Goals (SDGs) promoting a sustainable, greener, and circular economy.



SUSTAINABLE GOALS

Recognized as the 'Best Sustainable Product' at the Chemical Week Sustainability Awards, Deja[™] Carbon Neutral Pellet is made from locally sourced feedstocks.

For more information



Indispensable Chemistry

Bicomponent fibers



A new family of bicomponent fibers for *bonding natural materials* was introduced. These binder fibers are *blended with natural materials such as wood fiber to create thermal and sound insulating panels through the application of heat and pressure.*

The binder fibers have a polyethylene outer layer with a recycled polymer core of polypropylene or polyester.

Worth noting is that this product *allows the use of PP and PET recycle streams* (which are otherwise difficult to find applications for due to varying trace components), *along with waste wood byproducts, to be combined into high value products for the construction market.*





Fibers Segment

Polypropylene mono component fiber



Improvements in sustainability extend beyond the composition of the product to include the manufacturing processes employed by our customers. An intriguing development in fiber engineering at Indorama Ventures yielded a new polypropylene mono component fiber that provides carded nonwovens with a high degree of cushioning (combination of loft and resilience).

This fiber is used in calendar-based *thermal bonding processes to create a material that exhibits very similar characteristics* to those produced by more energy intensive through-air oven-based processes.





Fibers Segment – Recycled material

BREATHAIR® Comfortable And Durable 3d Cushion Material



BREATHAIR[®] is a highly innovative 3D spring structure, commonly used for the manufacturing of cushions, furniture, and bed sheets. Known for its superior elasticity and durability, this material provides users with long-lasting comfort. In addition to being washable and recyclable, BREATHAIR[®] has been commended for meeting the stringent hygiene standards of the Japan Textile Evaluation Technology Council (JTETC).

Key features:

- Mold prevention due to high breathability
- Reduced bacterial growth and mites cannot propagate well
- Easy to wash and dries quickly, since it is highly water repellent
- Suitable for ozone sterilization
- Easy to handle and maintain due to its light weight

Fibers Segment - Biodegradable

Bio-based PLA - Insect-proof And Compostable Nets For Farming



Being sustainable in many ways, *Texinov has developed insect-proof and compostable nets for farming.* The fine knitted net called FILBIO[®], produced by the French based company, not only *protects crops without using pesticides* with may be harmful to mankind or the environment, but also *protects against hail, wind, and climate stress*.

Made with *IVL's bio-based PLA, it is re-usable for up to three seasons*. Our IVL's German sites in Bobingen and Gubenproduce PLA staple fibers and filaments, which are *made from 100% renewable materials*. PLA gives off *significantly lower CO2 emissions* and has a *much lower energy consumption during the production of the raw material*.



CoolVisions[®] dyeable polypropylene - The All-Performance Fiber



CoolVisions[®] has *better chemical and stain resistance* when compared to other fibers. The fiber is much *lighter providing better coverage with less garment weight and fiber content.*

CoolVisions[®] has *excellent thermal insulation properties*.

Moisture management polyesters have engineered "channels" to transport moisture. To *avoid the "blocking"* of these channels, garments should not be laundered with fabric softeners or dryer sheets.

Machine wash cold. CoolVisions[®] *dries very quickly*. Lay *flat to dry or tumble dry* on low permanent-press cycle. Use *cool iron* if needed. *Do not dry clean*.

Dyeability is due to engineered fiber enhancements

Durable – Excellent toughness and abrasion resistance



TREVIRA CS : The Brand For Flame-retardant Textiles



Trevira's permanently flame-retardant polyester fibers form the basis for a new generation of functional textiles. *Their flame-retardant properties cannot be washed out and are not lost with age or usage.* Trevira CS textiles *offer long-term, built-in safety. Because fire has no expiry date.*

In fact, they consume fewer resources than natural fibers both during manufacture and in use, for example requiring less water and agricultural land. Polyester textiles also offer many other advantages during the usage stage.

The ecological washing process (short wash cycles and drying times, less consumption of water and detergent) is a real asset for the environment. Polyester is also non-toxic, does not outgas and can be easily recycled or safely incinerated to create energy.

To ensure resource- efficient use of materials, Trevira is committed to feed residual waste back into the production process wherever possible. In an agglomeration facility residual materials are reprocessed in order to create new serviceable raw materials with the same characteristics as the original products (such as flame retardancy) and are thus equally high performing.



Biotransformation Technology





Indorama Ventures and technology specialist <u>Polymateria Limited</u> have signed an exclusive 10-year partnership to help household brands bring biodegradable nonwoven hygiene products to the market through biotransformation technology.

This collaboration provides a new solution for dealing with essential items like facemasks and wipes once they have been used, ensuring they can return safely to nature without leaving behind any microplastics or toxic residue. *It is specifically designed to tackle plastic leaking into the environment as unmanaged waste, meaning it is neither collected for landfill nor recycled.* This partnership aims to do just that for essential hygiene items.

IVL's exclusive right to use Polymateria's unique biotransformation technology for nonwovens supports application in non-virgin resin recycling while *providing a solution for 'fugitive' used articles, especially those items that end up in the natural environment. This biotransformation process involves the plastic transforming into a bioavailable wax in the open terrestrial environment, whereupon the wax is fully consumed by bacteria, microbes and fungi, leaving just carbon dioxide, water, and biomass. The pulp component is inherently biodegradable under similar conditions.*

iCARE™ Heavy Metal-free Pet Fibers



iCare[™] is IVL's leading sustainable fiber brand, used in a variety of personal care products, such as baby strollers, baby diapers, car seat interiors, and food packaging.

To ensure that the products are safe to use, especially for infants and young children, $iCare^{TM}$ is manufactured without heavy metals, and strictly complies with the food additive provision of the US Federal Food, Drug, and Cosmetic Act (FFDCA).





Fibers Segment - Mobility

A Solution For Sustainable Car Seat Foams



Auraloop, a new sustainable and innovative solution from Faurecia and Indorama Ventures, is based on *100% recyclable polyester, designed to replace traditional car seat foams.*

This new material will *allow for a twofold reduction in the carbon footprint of car seat pad solutions* compared to current materials. It not only *meets the dynamic new market for car seats with improved performance and comfort,* but also embraces sustainability by *integrating materials that combine comfort with the circular economy* into future vehicles.

Key features :

- *Enhanced seating comfort*: A more open fiber structure and *better air permeability than current seating pad solutions.*
- *Improved breathability*: The seating facilitates *superior passive thermal regulation for occupants.*
- *Increased durability*: The seating's *resilience is sustained* by limited subsidence over its lifetime.

Fibers Segment - Mobility

Air bags & Seatbelt



The Indorama Mobility Group derives its strong position in the Airbag market from PHP Fibers who was the pioneer in the development and production of airbag filament yarns. The Enka® Nylon airbag yarns with different shrinkage behavior and with high or super high-tenacity in NDPF and LDPF (Normal respectively Low Denier Per Filament) characteristics in all required yarn counts and PET Airbag yarns enables the Group to provide the optimum yarn for all Airbag types and fabrics.

Passenger Car Light Truck (PCLT) Tire



The tire design and performance requirement continue to be influenced by the vehicle requirement including CO_2 emission, fuel economy, handling and braking properties, comfort, noise level and sustainability. We continue to develop products to address the evolving market needs which include ultrahigh tenacity (ECOTECTM) for weight and rolling resistance reduction, extra-high dimensional stability for enhanced handling (UNITECTM), bio-based raw materials and Resorcinol Formaldehye (RF) free dip recipe, recycled PET and bio-sourced PA for sustainability.

Aircraft Tire



To deliver the performance for the aircraft tire, we offer Enka® Nylon yarn and Aramid/PA66 hybrid cord to meet specific stringent requirements: Super high breaking tenacity to meet especially demanding properties during emergency running when the tire load may be doubled; ability to function in a very wide spread of working temperatures ranging from minus 50 °C or below to plus 150 °C; excellent adhesion to rubber for shock absorbing behavior during landing under harsh conditions; high fatigue resistance for long and save product life.





Thank you



