

ISSUE 04 - SUSTAINABLE FASHION

SEPTEMBER 2023

SPRING
— WISE **FUTURE
NOW**

THE TOP 10
IDEAS FOR A
MORE
SUSTAINABLE
FASHION
INDUSTRY



FASHION UNCONSCIOUS?

In an article from August this year, Sarah Kent, chief sustainability correspondent at The Business of Fashion posed the question: “Is fashion sleepwalking into the climate crisis?” She was surprised that after the extreme weather events of the summer, the climate had not come up as an immediate business risk on big fashion brands’ earnings calls.

On a practical level, many brands outsource production to garment workers located in the regions hardest hit by the effects of climate change. Dhaka, Bangladesh, recorded its highest temperature in six decades in April this year at 40.6 degrees Celsius (101.5 degrees Fahrenheit). The ready-made garment sector employs around 4 million people in Bangladesh, and people can’t work safely or efficiently in such extreme heat.

The fashion industry alone is not responsible for climate change. However, The United Nations Environment Programme (UNEP) does pinpoint overconsumption of fast, disposable fashion as a key contributor to the triple planetary crisis of climate, nature, and pollution and is canvassing hard for a more sustainable, circular textile value chain.

Elsewhere, new EU legislation on the horizon will require all fashion brands – from fast fashion to luxury – to pay for end-of-life collection, disposal, and recycling of goods.

The good news is that innovators from around the globe are working on solutions that could help brands capitalise on opportunities and adapt to challenges. We’ve curated just 10 of them in this edition of Future Now.

Change is coming. It’s time to get ahead of it.

Angela Everitt, Content Director, Springwise

SPRING WISE

ABOUT FUTURE NOW AND SPRINGWISE

In 2020, The United Nations dubbed this the ‘decade of action’ in order to foster greater urgency around meeting the Sustainable Development Goals by 2030. Decisions that drive change can no longer be kicked down the road. The future is now.

Solutions require innovation, and the hunt for those that make a real impact is the lifeblood of Springwise.

We publish three new innovations every day across our ecosystem. And each month we curate 10 of the most pertinent to create this report, Future Now, which is designed to inspire and catalyse action.

SAY NO TO WASTE



NEW MATERIALS FROM DISCARDED CLOTHES

The startup that is using textile waste to create planet-friendly resources

To tackle the mountains of textile waste in landfill, Berlin-based, female co-founded startup Re-Fresh Global is turning discarded clothing into new raw materials used to create products like cosmetics, cars, packaging, pharmaceuticals, fibres, and furniture.

The company uses its automated technology to sort and separate textile waste, depending on its material composition and colour. Then, its patented biotechnology transforms shredded textile fibres into industrial quantities of new and highly versatile resources.

This process creates three new raw material types: nanocellulose, ethanol, and sanitised textile pulp. The nanocellulose is strong and highly versatile, meaning it can be used in items including packaging, paper, and pharmaceuticals. The pure bioethanol (alcohol) has various useful applications across the beauty, sanitation, and biofuel industries. And finally, the textile pulp, made from recycled natural and synthetic fibres, can be used in the production of new fibres, whether that be for car upholstery or sound-absorbing workplace interiors.

Re-Fresh recently raised €1.1 million in a pre-seed round that will enable the company to continue its research and development (R&D) activities, further refine its biotech process, and accelerate marketing and sales activities.

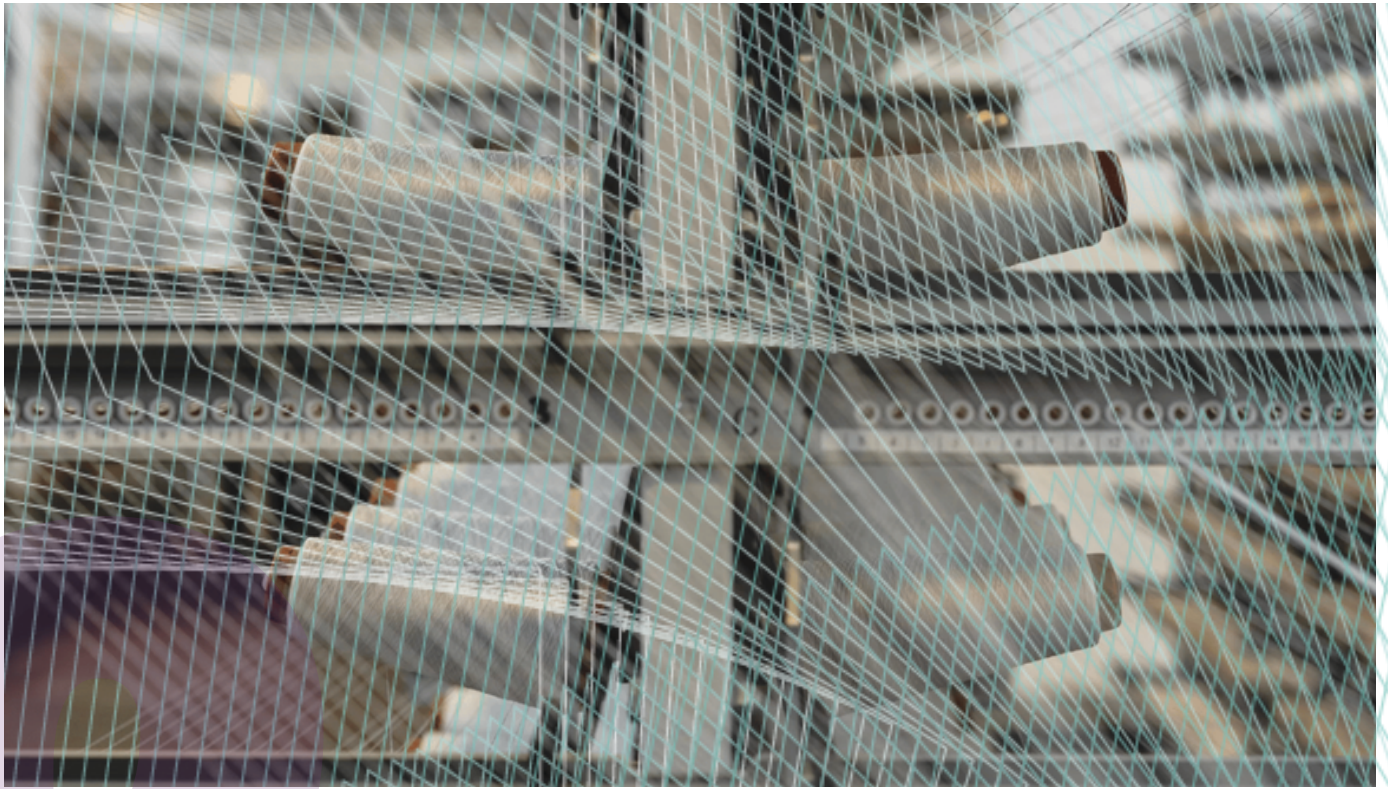


Photo credit: Unspun

3D WEAVING TACKLES FASHION WASTE

Could local micro-weaving companies help make fashion more sustainable?

US company Unspun has developed a unique solution to make textile production more sustainable. The company has developed automated, 3D weaving micro-factories, called Vega, that can weave a pair of trousers in 10 minutes. The factories allow brands to make products locally, reducing the need for manufacturing in large quantities – a major cause of waste. The company hopes to decentralise fashion production and reduce greenhouse gas emissions from shipping and waste.

Unspun recently announced it has raised \$14 million (around €17.6 million) in a series A funding round led by Lowercarbon, which will be used to support the development of the micro-factories. The company is also developing techniques to ‘unspin’ garments back into yarns, so that they can be re-woven into new products. The ultimate goal is to help brands achieve a local, circular supply chain for woven products.

GET AHEAD OF LEGISLATION

Legislators have started to address fashion’s environmental performance, particularly around waste. Published On 5 July 2023, the European Commission’s revised Waste Framework Directive proposes an EU-wide extended producer responsibility (EPR) system that will make fashion brands pay fees for every product they put on the market. These fees are designed to cover the costs of end-of-life collection, sorting, recycling and responsible disposal. The proposal also includes measures to control exports of used clothing to the Global South. All used clothes will be considered as waste under the proposed rules, until they are professionally sorted.

CREATING A FUTURE-PROOFED COTTON SUPPLY CHAIN

Growing cotton in greenhouses – which has never been tried before – is allowing UK startup Materra to increase output while decreasing pollution and water use. The company's method can produce up to four times more yield per surface area compared to conventional outdoor cotton farming. It also uses around 80 per cent less water, no pesticides, and produces around 30 per cent less carbon dioxide than chemically intensive cotton farming.

Materra's approach is designed to 'future-proof' the cotton industry – which around 250 million people rely on for income. By using resources more efficiently, Materra's system also acts as a form of climate change mitigation by transforming brownfield land into productive agricultural land.

ZERO-WASTE LUXURY WOOL WITH A FULLY TRANSPARENT SUPPLY CHAIN

An Italian luxury fabric company has mastered the art of wool recycling to create a fully circular, high-end fabric that is completely traceable. Using mechanical recycling, Manteco transforms pre-consumer scraps and leftovers, post-consumer garments, and industrial waste into soft, durable, and sustainably coloured yarns and fabrics. Manteco's MWool is internationally certified with a Life Cycle Assessment (LCA) and Environmental Product Declaration (EPD), and the company's processes saved more than 800,000 wool garments from entering landfill in 2021. Available in more than 1,000 colours, MWool contains no added chemicals or dyes. The colour of each fabric comes from the specific blend of recycled wools created by the company's expert mixologists. Manteco recycles its own production scraps as well as those of other companies, creating a zero-waste product that is fully traceable. Every business in the Manteco supply chain follows the company's charter of commitments regarding sustainability and traceability.



DO THE RIGHT THING

Remake, a not-for-profit advocacy group that aims to 'make fashion a force for good', was instrumental in the introduction of a bill in the US Senate last year called **Fashioning Accountability and Building Real Institutional Change (FABRIC)**. This bill proposes both new workplace protections and major incentives to accelerate US domestic apparel manufacturing. In tandem, Remake also campaigns to ensure that 'stolen wages' are paid by big brands to workers in the Global South, and right now Nike is in the firing line. The organisation supplies its growing global community with tools to spread its message on social media.



CREATING POLYESTER OUT OF WASTE CO₂

How one company is using molecular chemistry to transform pollution into usable fabric

French startup Fairbrics is seeking to replace traditional polyester fabrics with a net-positive version made from carbon dioxide. Currently, 60 per cent of textiles are made using synthetic, fossil-fuel-derived fibres – including polyester. As a replacement, Fairbrics captures CO₂ from industrial sources, and combines it with a catalyst and solvent to create the chemicals in polyester production.

Those chemicals are turned into polyester pellets that can then be spun into yarn and fabric. The CO₂ that Fairbrics uses is an incredibly inexpensive source of material. As well as directly preventing emissions from reaching the atmosphere, the process also further reduces overall emissions by curtailing the amount of petroleum used in traditional chemical processing.

The company is currently scaling its technology with the goal of reaching commercial industrial production levels within the next few years. And, in addition to using industrial emissions, Fairbrics is working towards a direct air capture (DAC) system to remove even more pollution from the atmosphere. DAC would help ensure the stability of the material supply while providing an important environmental benefit.

THE OPPORTUNITY

Wall Street market research company Polaris predicts demand for eco fibres, particularly recycled synthetic fibres, will more than double, from \$43 billion (around €39 billion) in 2022 to \$88 billion (around €80 billion) by 2032.

Patagonia is a pioneer in its use of recycled materials, while Adidas has pledged only to use recycled polyester by 2024. The opportunity is there for other brands. Two years ago, Research by First Insight and the Baker Retailing Center at Wharton University of Pennsylvania found that two-thirds of consumers would pay more for sustainable products, but equally, two-thirds of fashion executives thought they wouldn't. Those same execs will still be out of step if they believe that inflation has nipped sustainable intentions in the bud: Mintel 2023 insights show the opposite.

ALTERNATIVES...

Photo credit: MYCOTEX by NEFFA



A NEW PROCESS FOR CLOTHING MANUFACTURING USING MYCELIUM

New Fashion Factory (NEFFA) is developing a solution that produces apparel, footwear, and fashion accessories by moulding or 3D printing mycelium or algae

New Fashion Factory's mycelium-based product, MYCOTEX by NEFFA, takes just seven days to grow in a fermentation tank and uses no plastics or harmful chemicals. The manufacturing method is fully automated, without any weaving or stitching, which makes it viable for production at scale. To create a finished product, robots apply the biomass around custom moulds. The idea is that clothing will be produced locally, saving on the energy costs of transportation. Products can be manufactured by simply adapting existing machines, and the system can also create shapes and textures that could not be achieved with traditional methods. Unlike traditional fashions, NEFFA's clothing does not need any farmland, pesticides, or hazardous chemicals, and the process uses less water. MYCOTEX does not need to be washed in the machine, but can just be wiped clean, and, after usage, it can be home composted.

MUSHROOMS ARE STILL MAGIC

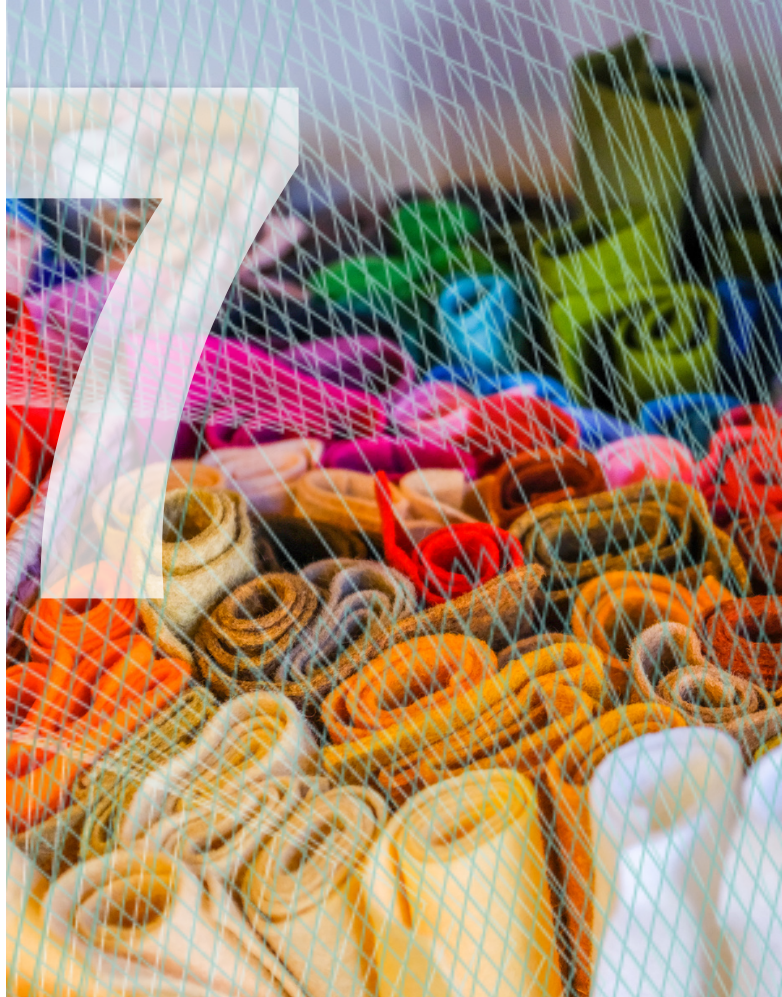
Don't discount mycelium in the wake of the news in June this year that Bolt Threads – a startup that produced a mycelium-based leather, Mylo, which was used by Stella McCartney last year for a limited run – has ceased production. This versatile alternative is still worth consideration, as NEFFA shows.

A REGENERATIVE PROCESS THAT'S REIMAGINING TEXTILES

This product can actually return nutrients to the earth at the end of a garment's life

Instead of requiring harmful dyeing, Werewool's fibres – which are made from agricultural waste – use naturally coloured proteins. By altering the DNA of a protein, Werewool's team can tweak its colour. Connecting these proteins to the circular fibres colours them naturally, without polluting waterways. The final fibres are fully biodegradable and circular. Instead of needing petroleum-based raw materials and synthetic dyes, Werewool utilises natural and renewable resources, with a regenerative process that returns nutrients to the Earth at the end of a garment's life.

Werewool could, in future, replicate any natural property in its fibres, including making them antimicrobial, stretchy, or waterproof.



While the company is still in the early stages of development, it recently announced a \$3.7 million (around €3.4 million) seed round led by Sofinnovva Partners and Material Impact.

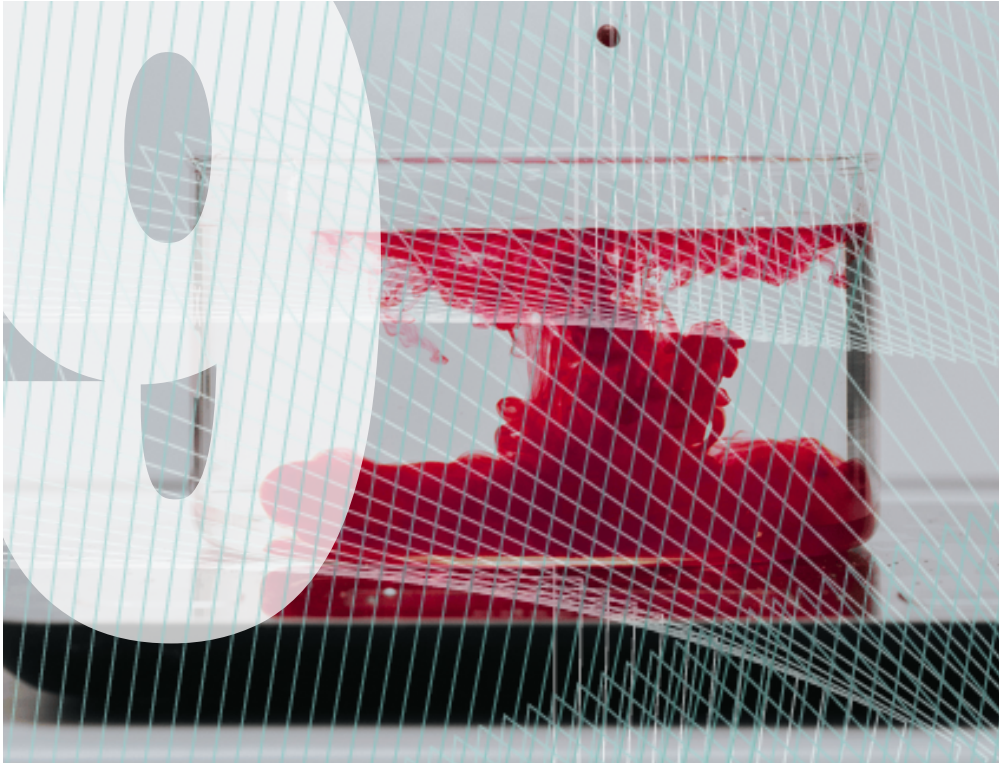
A LEATHER ALTERNATIVE FROM BEER WASTE

Spent grain from brewing practices is usually burned, sent to landfill, made into gas, or used as cheap feed for livestock. All of these are low-value enterprises. So, instead, one startup, Arda Biomaterials, is utilising this cheap waste product to create leather, without needing to farm animals for their hides.

The company is currently working with breweries from South London's 'Bermondsey Beer Mile', which was once the leather tanning district of the City of London, to make its leather alternative.

The material is produced by taking grain that has had its sugar removed for brewing purposes, also known as brewer's spent grain (BSG). This grain is rich in protein and fibre, which makes it an ideal blueprint for a leather alternative. It is chemically treated and manipulated in order to create a material that resembles conventional animal leather, a process developed by the company's founders Edward TJ Mitchell and Brett Cotton.

The startup has just received a £1.1 million (around €1.3 million) investment led by Clean Growth Fund, a UK cleantech venture capital fund, with a view to launching the product next year.



DETOXIFYING TEXTILES WITH LOW-HEAT, LOW-ENERGY BIOPIGMENTS

This new dying process uses less water and is faster than traditional methods

French biotechnology company Ever Dye has turned to chemistry to create non-toxic textile dyes that work at ambient temperatures.

The startup's patented innovation combines organic and non-organic materials that are petroleum-free. An engineered organic polymer binding agent is applied to fabrics as a pretreatment to create anchors for the pigment so that when colours made from a mix of vegetal waste and minerals are applied, they attach to those sites. No heat is used to make the colour 'stick', and the entire process takes around five times less time than traditional techniques.

To make it as easy as possible for brands to make the switch to non-toxic and non-polluting dyes, Ever Dye customises the set-up of the process to a manufacturer's existing machinery. As well as requiring no additional infrastructure investment, Ever Dye's process also eliminates huge pools of toxic wastewater. Instead, a simple mechanical filter cleans the remaining water for reuse or release.

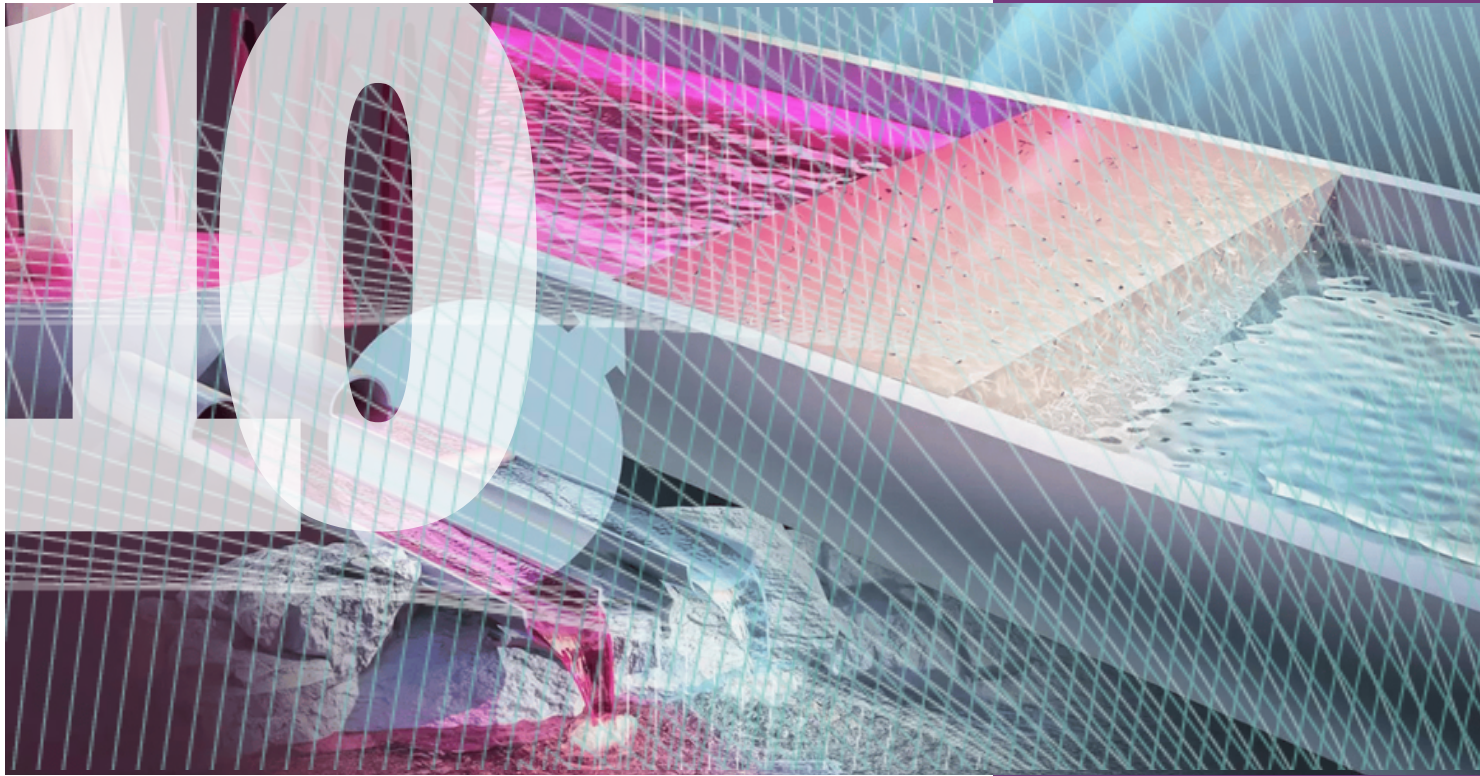
TACKLING THE HARMFUL IMPACT OF DYEING TEXTILES

Dyeing and finishing processes in the fashion industry are responsible for three per cent of total global carbon emissions, with most clothing brands using high-temperature systems that require energy, water, and petrochemicals to achieve the desired colours.

According to the Ellen Macarthur Foundation, 20 per cent of waste water worldwide comes from fabric dyeing and treatment.

Natural dyes are difficult to produce at the scale needed for the global fashion industry, which is why chemical-heavy colours remain so common.

Now, as innovators pursue ideas for cleaning up the industry as a whole – from waterless dyeing to air drying and bacteria-cleaned wastewater – the scale of potential solutions may be growing large enough to be sustainable. Technologies like Ever Dye's, which don't require any substantial alterations to be made for the manufacturer to adopt them, are key.



TACKLING POLLUTION BY REMOVING DYES FROM WATER

Researchers have developed a cellulose powder that could remove a large proportion of dye and heavy metal contamination from waterways

A team at Sweden's Chalmers University of Technology, led by Gunnar Westman, Associate Professor of Organic Chemistry, have developed a new method for purifying contaminated water using cellulose-based nano-crystals. As contaminated water passes through the material, the pollutants are absorbed. Sunlight then causes the pollutants to quickly break down.

The cellulose crystals can also be adapted and modified to remove a wide variety of pollutants in addition to dyes. In an earlier study, the group demonstrated that toxic hexavalent chromium, which is commonly given off by the mining, leather, and metal industries, could also be removed with a similar process.

Laboratory tests of the material have shown that it removes more than 80 per cent of dye pollutants, a potential boon for the fashion industry which, according to [some sources](#), is responsible for around 20 percent of global water pollution via textile dyeing and finishing processes.

INNOVATORS FEATURED

1. Re-fresh global
re-fresh.global

2. Unspun
unspun.io

3. Matterna
matterna.tech

4. Manteco
manteco.com

5. NEFFA
mycotex.nl

6. Fairbrics
fairbrics.co

7. Werewool
werewool.bio

8. Arda Biomaterials
arda.bio

9. Ever Dye
everdye.fr

10. Chalmers University
chalmers.se

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