

How the research of five Flemish
universities improves our society

A world of difference

2025

foreword

Dear reader,

A university is the ultimate place in which to do free and independent research, fuelled by the pursuit of new insights by its scientists.

But does this mean that the knowledge and technologies originating from the five Flemish universities are also independent of the needs of society? Not at all. We are committed to a quadruple helix collaboration model, in which scientists, industry, governments and citizens join forces. In this way, our researchers keep their finger on the pulse and know what is important in society. The model means that curiosity-driven research often emerges naturally in the search for answers to major societal challenges.

Providing a service to society is also one of the basic tasks of a university. And as technology transfer offices our role in this is fundamental. For example, we make it possible for thousands of research contracts to be agreed every year between our scientists and the private sector, among others ([see p. 52](#)). These are demand-driven by definition: diverse stakeholders from society contact us with a question, and we help them to find answers.

Neither can you call the spin-off companies and the licences that we market detached from social reality. After all, a new company or patent only stands a chance if it makes a difference, in other words, when it offers a solution for a need in society. Moreover, it is increasingly so – particularly in the case of spin-offs and licensing opportunities – that contact is already made early on with established names in business. **In this way, the knowledge or technology we offer is immediately well adapted to market demand.**

Within the spiral in which research institutions, industry, governments and citizens circle, new and fundamental questions continue to bubble up and inspire our scientists. Because again, their ideas rarely appear from nowhere, and provide potential for innovation.

This feedback circuit in the Flemish knowledge ecosystem is reaping its rewards. Flanders is among the best in class in Europe when it comes to converting scientific research into tangible innovations. This brochure compiles **25 recent examples** of what such valorisation can be in the areas of 'Food & Agriculture', 'Health', 'Energy & Sustainability', 'Digitalisation & Technology' and 'Society'.

In each of these examples we played an important role, as technology transfer offices, in efficiently transferring knowledge and technology from university to society. We will continue to do so in the coming years. In this way, we are keen to continue making a world of difference with the excellent work that is ongoing at our five research institutes!

Enjoy the read,

An Van den broecke (Ghent University), **Elke Piessens** (Hasselt University),
Jurgen Joossens (University of Antwerp), **Paul Van Dun** (KU Leuven), **Sonja Haesen** (VUB)

table of contents

FOOD & AGRICULTURE 1

HEALTH 2

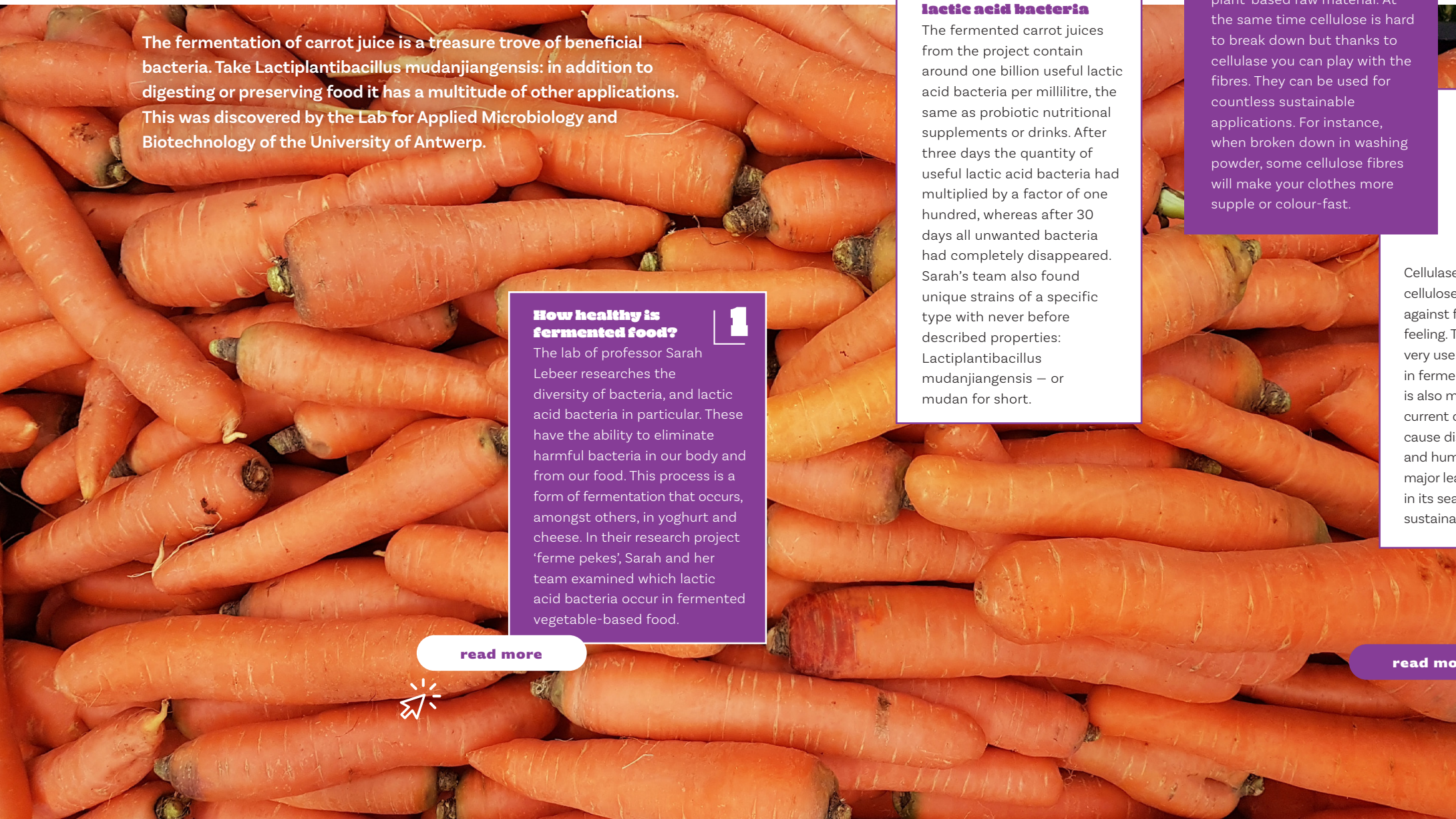
ENERGY & SUSTAINABILITY 3

DIGITALISATION & TECHNOLOGY 4

SOCIETY 5



Fermenting of carrots has led to the discovery of an extremely useful bacterium



The fermentation of carrot juice is a treasure trove of beneficial bacteria. Take *Lactiplantibacillus mudanjiangensis*: in addition to digesting or preserving food it has a multitude of other applications. This was discovered by the Lab for Applied Microbiology and Biotechnology of the University of Antwerp.

1 How healthy is fermented food?

The lab of professor Sarah Lebeer researches the diversity of bacteria, and lactic acid bacteria in particular. These have the ability to eliminate harmful bacteria in our body and from our food. This process is a form of fermentation that occurs, amongst others, in yoghurt and cheese. In their research project 'ferme pekes', Sarah and her team examined which lactic acid bacteria occur in fermented vegetable-based food.

[read more](#)



2 Carrot juices as a treasure trove of lactic acid bacteria

The fermented carrot juices from the project contain around one billion useful lactic acid bacteria per millilitre, the same as probiotic nutritional supplements or drinks. After three days the quantity of useful lactic acid bacteria had multiplied by a factor of one hundred, whereas after 30 days all unwanted bacteria had completely disappeared. Sarah's team also found unique strains of a specific type with never before described properties: *Lactiplantibacillus mudanjiangensis* – or mudan for short.

3 Mudan: countless sustainable applications

Amongst others, mudan contains cellulase, an enzyme capable of splicing and breaking down cellulose. This is invaluable for the bio industry: cellulose is an important plant-based raw material. At the same time cellulose is hard to break down but thanks to cellulase you can play with the fibres. They can be used for countless sustainable applications. For instance, when broken down in washing powder, some cellulose fibres will make your clothes more supple or colour-fast.

4 Sustainable food and medicines

Our human cells are incapable of digesting cellulose and that is why people experience digestive disorders.

Cellulase can break down that cellulose and as such it helps against flatulence or a bloated feeling. The mudan bacterium is very user-friendly, for instance in fermented vegetables. It is also much safer than the current cellulases, which can cause diseases in both plants and humans. This discovery is a major leap for the bio industry in its search for more sustainable food or medicines.

[read more](#)



Turning a byproduct into a valuable raw material, that is the result of the Fun4Bio project conducted by KU Leuven. In a study commissioned by Citribel, the researchers examined how fungi used in the production of citric acid could be given a new lease of life. As it turns out, this amazing fungus has a great deal of unsuspected potential!

1

What social challenge does this project address?

Kristof Brijs, innovation manager at the Laboratory for Food Chemistry and Biochemistry (KU Leuven): "It fits in closely with the major challenge our (agri-)food industry is facing right now: the transition towards a sustainable food chain. Citric acid producer Citribel wants to make its production process more circular. Every year the company produces massive quantities of citric acid through a fermentation process that yields mycelium, the lion's share of which is processed in animal feed after use. Citribel wanted to know for what other purposes this byproduct could be used."

2

What were the results?

"Close examination of the structure and all the molecules of the mycelium revealed that in addition to proteins and minerals, the fungus contains two other interesting components. A multidisciplinary collaboration with three other research groups at KU Leuven led to new applications such as plant protection and animal feed. Because what did they find? Boosting crop protection with specific components of the fungus resulted in a considerable higher crop yield. We tested the fungus on pig feed: the components of the fungus made the piglets more resistant to disease, reducing the need for antibiotics."

3

Do you see additional potential for this discovery?

"Absolutely! We are now looking into nutritional applications because the components have several interesting properties, such as water binding and fat replacement. Take bread, for instance: adding one of the components of the fungus fosters water retention, keeping the bread fresh for longer."

WATCH THE VIDEO



Stronger plants and healthier piglets thanks to a 'good' fungus

This ICON project (Interdisciplinary Collaborative Research that builds a bridge between research and application) brought several partners together: 4 research groups at KU Leuven teamed up with 3 agri-food companies (Citribel, Nutrition Sciences and Globachem).



Innovation in food industry through centuries-old fermentation techniques

For decades, the research group Industrial Microbiology and Food Biotechnology (IMDO) at the Free University of Brussels (VUB) has been conducting research into spontaneous fermentation processes for the production of fermented food and drink. Their research constitutes the gateway to innovative, new, tasty and more sustainable products.

Spontaneous fermentation processes have been making a comeback in recent years. People brew their own beer at home, bake sourdough bread or make kombucha. That's all fine, says professor Luc De Vuyst of IMDO. "Spontaneous fermentation owes its popularity to the fantastic flavours and aromas resulting from the natural and sustainable processes. This revival fits in with traditions that are tens of thousands of years old."

From spontaneous to more controlled

Today a multitude of processes across the globe are still based on spontaneous fermentation whereas their standardisation offers a host of advantages. "Commercial starter cultures make it possible to obtain the desired end product." That is why in the fifties they were introduced in breweries, bakeries, the dairy and meat industry and subsequently in the wine industry as well.

The VUB's research is aimed at gaining a deeper understanding of the existing fermentation processes in order to introduce more controlled starter cultures there as well. Luc De Vuyst: "This helps us avoid the failure of the fermentation process and at the same time you can direct the process with a certain aroma, flavour or end product in mind."



In the past we've had quite a few successful collaborations of this nature with the business world. Based on our results, companies can adapt and improve their processes, and launch new products."

For instance, in salami the research group's insights make it possible to forego the use of nitrite and nitrate salts. They are replaced with bacteria that are naturally present in meat and that generate antimicrobial agents that foster food safety. This is part of the research conducted by professor Frédéric Leroy of IMDO.

Controlling the fermentation process can lead to crazy innovations. "Suppose you want to create strawberry-flavoured chocolate, then you use the fermentation process to select microorganisms that produce similar aromas instead of adding artificial aromas. This leads to a (more) natural end product."

Analysis down to DNA level

"We try to understand on both a microbial and biochemical level how these spontaneous fermentation processes work and, more specifically, to use them to produce high-quality end products in terms of taste and aroma. By studying the active microorganisms in detail we can characterise the functionalities that play a role in the fermentation process. If we know which microorganisms are involved and what their precise function is then we can use them as a starter culture in virgin raw materials and better control the processes."

It is this understanding of precisely what takes place in the microorganisms that the research group examines, right down to a DNA level.

Professor Stefan Weckx of IMDO: "I mainly focus on the molecular biology aspect of the research by mapping out the genome of interesting strains that can direct the fermentation through DNA sequencing. Knowing which genes are present deepens our insight into the metabolic paths to achieve the desired properties, and we also check those strains for the presence of harmful genes."

Own bakery, brewery and chocolaterie

To test the academic research results, VUB often partners up with the business world to develop controlled processes and new products. In addition, the research group recently launched three pilot lines of its own. This means that VUB now has its own (sourdough) bakery, brewery and chocolaterie. "The pilot lines enable us to conduct our research under optimal circumstances. Those products will one day be marketed under the brand name Saint Vé", he reveals.

The pilot line for sourdough bread was developed in collaboration with spearhead cluster Flanders' FOOD and VLAIO, which subsidises 80 percent of the equipment for the line. "We use this line for research carried out with companies: into aroma and flavour but also into potential health benefits of the sourdough bread. Spearhead cluster Flanders' FOOD cultivates the necessary contacts."

Sharing insights in countries of origin

The research group's insights are shared globally, including the countries where the virgin raw materials were sourced. Stefan Weckx: "For instance, the insights from our VLIR-UOS project are being implemented among cocoa farmers in Ecuador. The spontaneous fermentation of cocoa beans frequently fails in Ecuador. We want to change this by deepening the farmers' knowledge through projects that develop new fermentation strategies locally. We also maintain an academic partnership with Ecuadorean colleagues who come to acquire more knowledge at VUB university."

WATCH THE VIDEO



This helps us avoid the failure of the fermentation process and at the same time you can direct the process with a certain aroma, flavour or end product in mind.

Sugar that doesn't affect your teeth and even benefits your bowels

There's a new kind of sugar that provides an answer to some of the major drawbacks of classic granulated sugar. A sweetener that is low in calories and doesn't ruin our teeth: is kojibiose about to become a fixture in the pantry?

He knows he has a sweet tooth and that is why sugar professor Tom Desmet (Ghent University - Faculty of Bioscience Engineering) devotes all of his time searching for new kinds of sugar that are not just more ecologically sound but also healthier than classic beet sugar, commonly known as granulated sugar or table sugar. Kojibiose signals a major breakthrough.

How did you discover kojibiose?

Professor Tom Desmet: "Kojibiose in itself is nothing new. It is already present in nature in small quantities, for instance in honey. During our protein research we discovered there is a certain enzyme that

releases kojibiose as a byproduct. We adapted the enzyme in such a way that it now secretes kojibiose as its main product so that it can be produced on an industrial scale."

Why is it so innovative?

"We don't know the full picture yet but we have already discovered properties in kojibiose that are absent in traditional sugars. For instance, the calorie content is significantly lower, up to 20%. Moreover, unlike other sugars, kojibiose doesn't cause tooth decay. And the icing on the cake is that kojibiose has a prebiotic effect, in other words it's good for your intestinal flora. Classic granulated sugar does the opposite."

And the taste?

"In terms of taste it is like most sugars: sweet. However, kojibiose is only half as sweet as the classic reference. Kojibiose will not be sweet enough for the products you turn to when you crave something really sweet such as soft drinks or candy. However, for other products like cake or yoghurt - of which you don't expect an explosion of sweetness - it can act as the perfect replacement."

When can we expect this sugar to be marketed?

"Unfortunately it takes a long time for such products to effectively hit the shelves. This is because a host of official bodies must approve nutritional ingredients, a rather costly enterprise requiring vast quantities of data. We have meanwhile been re-searching kojibiose for five years and I hope it will be ready for market in another three to five years."



Hemp extracts polluting agents such as PFAS from arable soil. This is the outcome of tests performed by the Centre for Environmental Sciences (CMK) of Hasselt University under the direction of Dr. Sofie Thijs and C-Biotech, the sustainable company of entrepreneur Frederik Verstraete, at six different locations in the vicinity of the 3M plant in Zwijndrecht. And what's more: the harvested plants themselves are also given a new lease of life by processing them in, amongst others, building and textile materials.

Hemp extracts PFAS from polluted farmland

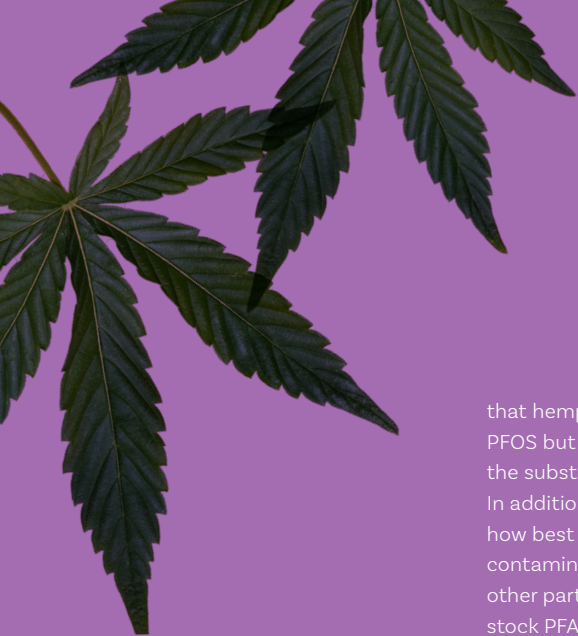
Soil remediation using green technology

The process by which plants remediate polluted soil is called phytoremediation. Plants use their roots as a pump to extract water and nutrients from the soil. Some plants use the same process to uptake contaminants from the soil. The Centre for Environmental Sciences of UHasselt (CMK) has been using the technique for some 25 years through short rotational wood such as willows, poplars or, since recently, hemp plants.

PFOS and PFAS in the leaves

The remedial properties of the plant is being used, for instance, to treat the contaminated soil around the nuclear plant of Chernobyl. Together with the company C-Biotech the CMK is now initiating a trial project to remediate the environment around the Zwijndrecht site of industrial giant 3M. The land in the vicinity of the plant has been severely contaminated with PFOS, a toxic substance belonging to the PFAS family. The researchers have discovered





The hemp harvest would give farmers an income during the sanitation period.



that hemp not only absorbs PFOS but also accumulates the substance in its leaves. In addition, they researched how best to eliminate the contaminated parts. Incidentally, other parts of the plant do not stock PFAS and lab tests showed them to be perfectly suitable as raw material for the bio industry.

Revenue model for farmers, also during sanitation

This way hemp plants can provide a solution for farmers who can no longer work their land due to contamination. They are easy to grow and, contrary to willows and poplars, they can be harvested entirely annually. Also, the hemp harvest would give farmers an income already during the sanitation period. The cultivation of hemp is subject to regulations: you have to apply for authorisation and harvesting is allowed twice a year.

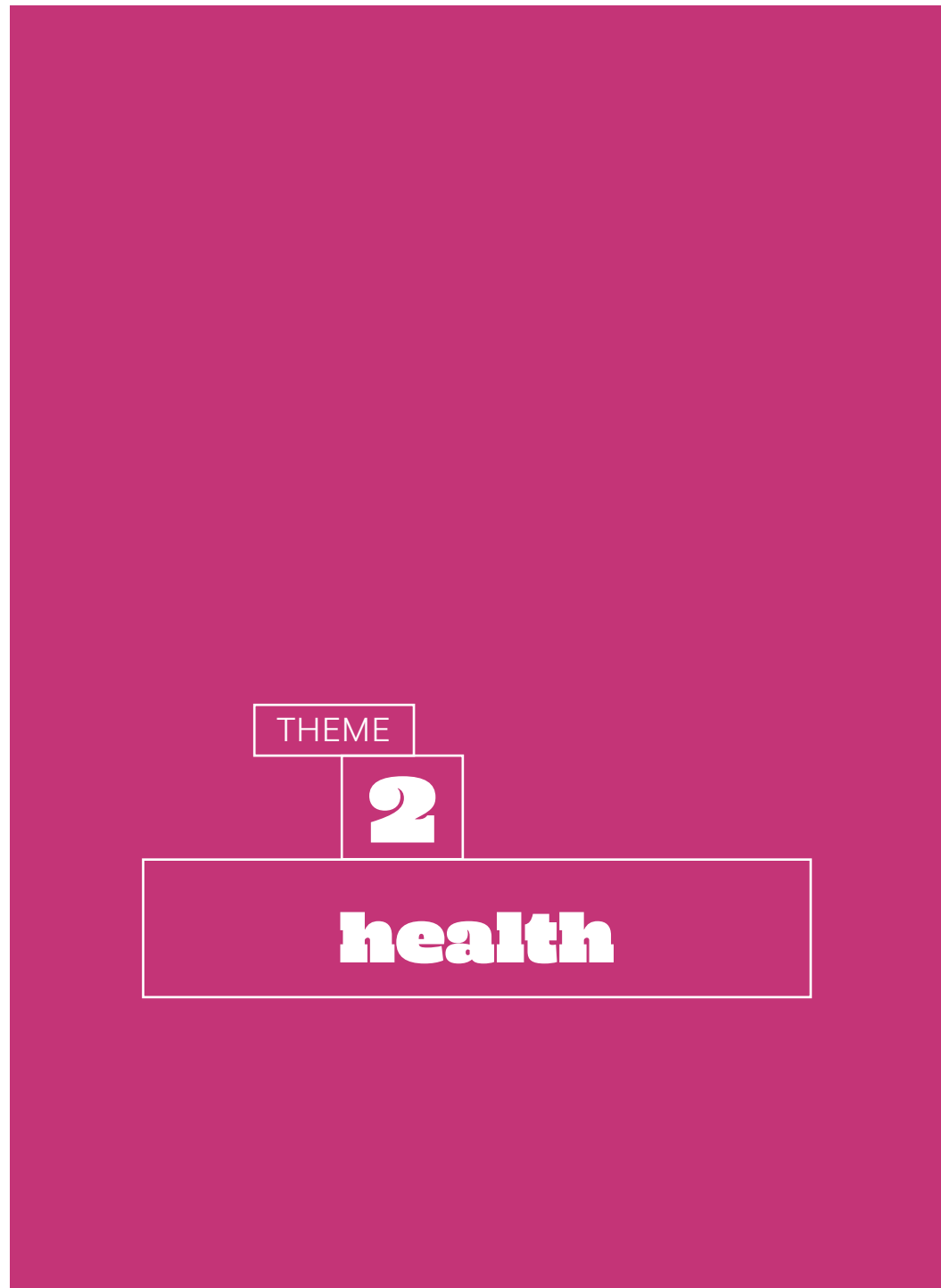
Building material that captures CO₂ from the air

Industrial hemp, not to be confused with the hallucinogenic variety, has been a key raw material in the bio industry for centuries. The thick and firm stem with a diameter of some four centimetres is used for, amongst others, building materials. In the textile industry hemp is a sustainable alternative to cotton. The environmental impact of

the plant is minimal: hardly any pesticides are necessary for a successful harvest and the water requirement is 90% less than with the average plant. As it grows it removes a great deal of CO₂ from the air, up to four times as much as the average tree.

Does hemp further the European Green Deal?

Hasselt University and C-Biotech have decided to take things to the next level and roll out a pilot project on a larger scale with the support of 3M. At the same time, Hasselt University, in conjunction with a number of other research institutions, is researching how hemp can contribute towards achieving the goals of the European Green Deal. For this they are joining forces with the European Industrial Hemp Association (EIHA), which recently bestowed an award on Hasselt University PhD student Simon Vandersanden for his research on this subject under dr. Sofie Thijs.



THEME

2

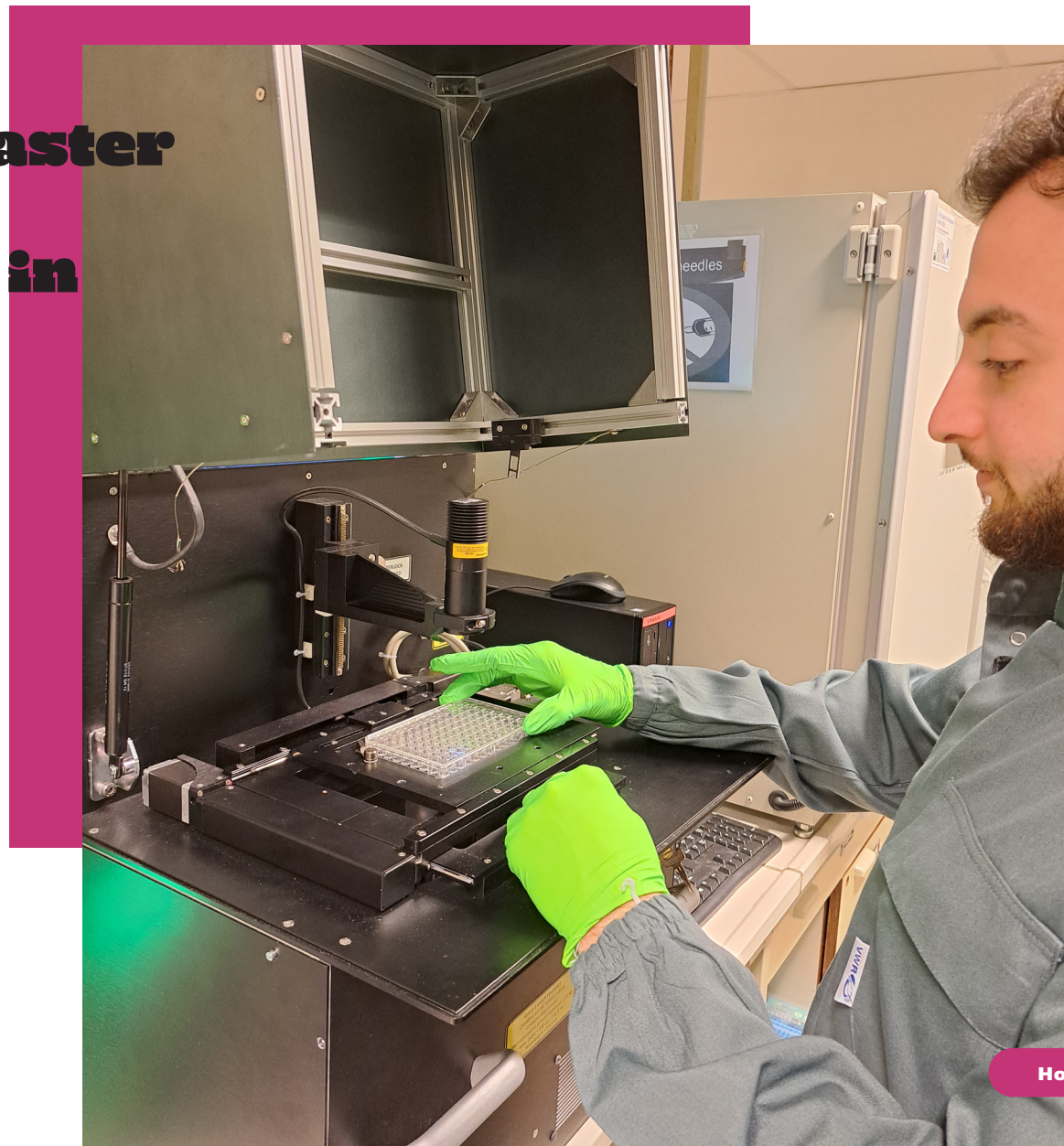
health

Photoporation, a new technique developed at Ghent University, has enabled a breakthrough in the application of cell therapy. Although this treatment method has been used for quite some time to cure cancers, it is still quite flawed. But now a solution is in the works that could help patients just a few years from now.

Cancers heal faster thanks to new developments in cell therapy

“We are on the verge of a revolution. Cell therapy, therapy on the basis of genetically altered cells, is looking very promising to rid the world of a variety of diseases in the near future”, Ghent University professor Kevin Braeckmans enthusiastically declares. “We should be able to cure not just cancers but even illnesses like HIV.” He has devoted the last decade to improving the genetic alteration of therapeutic cells. And the results look very promising indeed. That is why he founded the spin-off Trince, to market the new technique.

The process behind cell therapy is as follows: the genetic material of patient cells is manipulated in the lab in such a way that they can help combat the patient’s disease. Subsequently the cells are re-injected into the patient’s body. It is a kind of immune therapy that is already being used in the treatment of some forms of blood cancer.



Wherein lies the challenge?

Professor Kevin Braeckmans, co-founder of Trince: “Right now the genetic manipulation of cells is a rather invasive process and as a result the cells may no longer be in optimal condition. Deteriorating cell quality is detrimental to the healing process.”

What is the solution?

“We have developed a new way to alter cells that has minimum impact on cell quality. We do this through a process called photoporation: we use a laser and nanoparticles to perforate the cell membrane. This gives you great control without the risk of unnecessary damage. We are not the only ones to implement this technique but our technology is safer and less invasive than others. And since it allows faster cell production, it is also more affordable and treatment is faster.”

What are the next steps?

“Last year we founded Trince after a decade of research at Ghent University. The goal is to sell the first devices and reagents to R&D labs sometime in 2023. They will be able to use these devices to genetically alter their biological cells. Then we think it will take another two years to get the technology ready for use in patients.”

How does Trince’s technology work?



The ability to easily and smoothly pilot a wheelchair long eluded people with complex movement disorders as the result of cerebral palsy. CoMoveIT Smart – an innovation by KU Leuven – is the first operating system in the world aimed at this target group consisting of 17 million people worldwide. Thanks to CoMoveIT Smart they regain their autonomy.

Smart wheelchair unlocks the door to a new life



A wheelchair operated by a joystick is not an adequate solution for this group. Their movement disorders mainly consist of uncontrolled movements that result in jolting movements of the wheelchair, causing many to give up.

Thanks to the smart operating system CoMoveIT Smart the wheelchair moves smoothly, making a world of difference. People who until recently depended on a carer can now regain their autonomy. Merel confirms this. She suffers from dyskinetic cerebral palsy (CP) and tested the system for some 45 minutes: "I would like to continue to drive on my own." The same reaction comes from Laura, a girl with spastic quadriplegic CP: "I want to keep it!"

How does it work?

CoMoveIT uses pressure sensors that capture involuntary movements. The driver has to do virtually nothing. The signals are processed by an algorithm in a small computer at the back of the wheelchair, from where the wheelchair is operated. The algorithm ensures smooth movement.

Moving around independently again

Frederik is also practising to get the hang of the operating system. "My MS makes it difficult for me to use my hands and operate the joystick of my wheelchair. A few weeks ago my electric wheelchair was equipped with CoMoveIT Smart. I now have a pedal that allows me to drive forward or backward with my right foot. To drive forward I just have to press with my foot. To drive backwards, I press my head on the pressure pad behind the pedal with my foot. To the right and left of my head there is also a pressure pad, which allows me to turn. The display menu is easy to operate via the pressure pad: I can control the lights, the direction indicators, the horn and the acceleration of my wheelchair."

"I'm currently practising one hour a day under supervision and I'm improving every day. For now, driving through a doorway is still a bit more difficult than in a wide corridor. It is especially important that my foot is in the right place on the pedal to operate it smoothly. Most of all, I'm very happy to be able to move independently again."

Conclusion: CoMoveIT Smart boosts the patient's independence, social participation and quality of life. More autonomy means less support, which reduces the social costs. For society this is a win-win at multiple levels: for the users, for their environment and for society.

The development of CoMoveIT is the result of a collaboration between three departments at KU Leuven:

Rehabilitation Sciences, Industrial Sciences and Bioengineering Sciences.

- » Start of research project: 2017
- » Launch spin-off: 2021
- » Funding round in September 2021 and on the market since March 2022. Late September 2022 the first wheelchair operating systems were delivered.
- » **The ambition:** go international as a niche product. Meanwhile the first orders from the Netherlands and Germany have been received.



WATCH THE VIDEO



What if we could help women fulfil their wish to become a mother without the burdening hormone treatment? That question was at the heart of pioneering research initiated at VUB university almost two decades ago. The result? A new method for maturing oocytes (in vitro maturation): CAPA-IVM. The spin-off Lavima Fertility aims to make this innovative method attainable for all women.

The co-founder of Lavima Fertility, professor emeritus Johan Smitz, is confident that the IVM method developed by his research team in conjunction with the Brussels IVF centre of UZ Brussels hospital (under the direction of professor Michel De Vos) can become the successor of IVF. "IVF enables us to help many women but it comes at a price. The lion's share of the treatment is borne by the woman. Even perfectly fertile women must undergo hormone treatment if their partner is infertile. That treatment has a major impact on both the daily lives of those women as well as on their mental and physical health. A considerable percentage of women experience a variety of side effects that can be very serious."

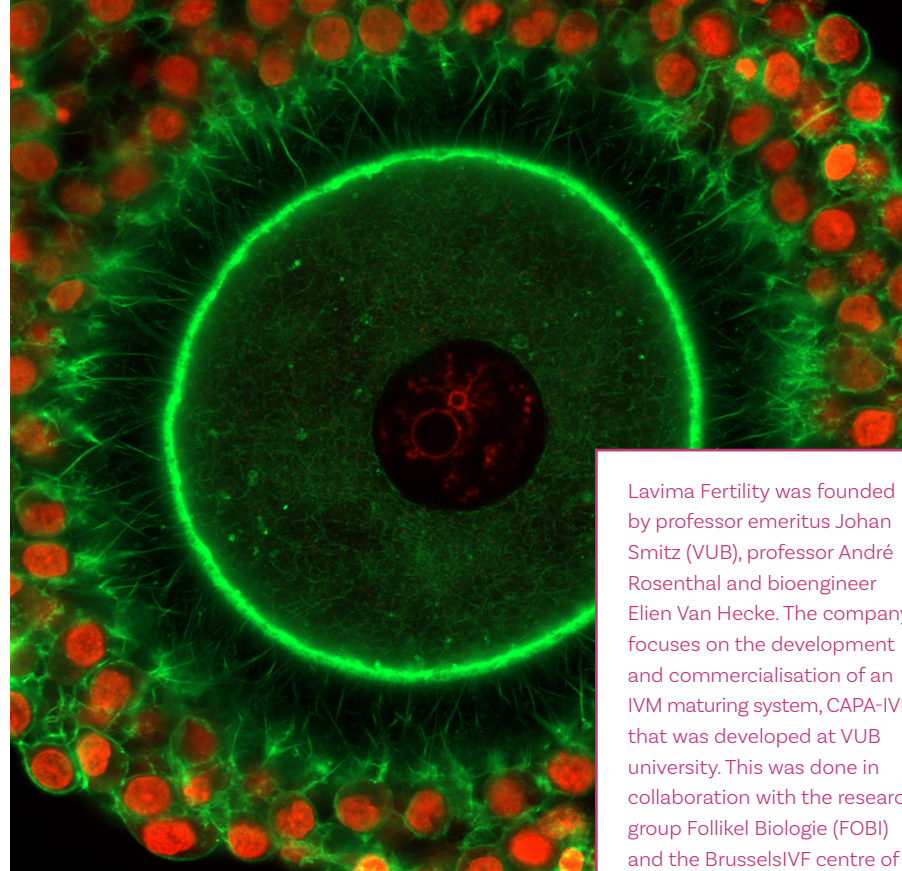
"Many women would also be much better off than with the current IVF technique, such as female cancer patients or women with polycystic ovary syndrome (PCOS), which affects as many as one in ten women. They run the greatest risk of complications from hormone treatment. We find it unacceptable that so many women worldwide are exposed to this risk. That is why we developed a technique to treat them without the risk of complications."

Meanwhile some 200 PCOS patients have given birth using this new method and a recent study has shown that at the age of two, these children exhibit no developmental delays compared to children conceived through conventional IVF treatment.

Less hormones and not as long

The biggest differences with IVF are mainly situated in the stage before in vitro fertilisation. In vitro fertilisation requires hormonally stimulated mature oocytes, whereas the researchers discovered an improved in vitro method to collect sufficient embryos from immature oocytes for replacement in the womb. This world first is the result of years of research.

"The crucial part for us is that women can be treated with a minimum of hormone injections: no more than two days as opposed to an average of seven to ten days with IVF. On the fourth day after the start of the treatment we collect ova from the small follicles in the ovaries. These immature ova are then left to mature in vitro." This is slightly more labour-intensive for the lab personnel but the advantages for the women are enormous: the hormone treatment becomes all but unnecessary, eliminating all health risks.



Lavima Fertility was founded by professor emeritus Johan Smitz (VUB), professor André Rosenthal and bioengineer Elien Van Hecke. The company focuses on the development and commercialisation of an IVM maturing system, CAPA-IVM, that was developed at VUB university. This was done in collaboration with the research group Follikel Biologie (FOBI) and the Brussels IVF centre of UZ Brussels hospital.

A microscopic image of an ova surrounded by cumulus cells.

fertilisation. CAPA-IVM opens up new perspectives for this group as well."

One in two opts for CAPA-IVM

Now it's up to Lavima Fertility to convince fertility doctors of the value of this treatment strategy through data. Or better still: let women choose which method they prefer, says Johan Smitz. "In our partner hospital in Vietnam we ran several studies. That is where we have made the most progress with the implementation of our technique. One in two women

there opts for CAPA-IVM, partly because it only costs half as much as IVF."

As the CAPA-IVM treatment is also much faster, this also means a cost saving for social security or the infertile couples themselves in countries where fertility treatments are not reimbursed, which is the case in nine out of ten countries."

Another five percent

The technique is already quite advanced but further research is necessary, Johan Smitz confirms. "It is correct that our results are not yet as good as with IVF. Whereas an initial replacement offers a 40% chance of pregnancy in the case of IVF, the odds for CAPA-IVM are some 5 percent lower. Of course, IVF has several decades of head start. That is why we continue to refine the technique in tandem with VUB university, UZ Brussels hospital and our foreign partner institutions until the technique is at least as reliable as IVF."

He is noticing that "more and more doctors are becoming receptive to our innovation. Especially in countries where patients' foot (part of) the bill themselves there is an awareness that our 'cheaper' method can help more women. For example, in the US only one in ten women can afford IVF treatment. Here in Belgium up to six IVF treatment cycles are reimbursed. Here women become pregnant after an average of 2.5 oocyte pickups and after five unsuccessful attempts more than half of the couples give up*, probably because the treatment is too demanding. As a society you might ask if it isn't better to go with the cheaper and less burdening method."

The next step is to help women who are infertile as a result of severe metabolic disorders. "We want to collect oocytes from women who are ill and treat them in vitro to increase their odds of

[read more](#)



* Belgian IVF Register: BELRAP

The new IVF: less burdening for women

Charcot-Marie-Tooth disease (CMT) is the most common form of hereditary neuropathy or nervous diseases. However, there is no treatment available. That is, for the time being, because professor Esther Wolfs and her team at Hasselt University are doing their utmost to change this. They are the first research group in the world to try and understand the disease, through wisdom teeth.

How wisdom teeth help combat an as yet untreatable disease

Professor Esther Wolfs, what is Charcot-Marie-Tooth disease exactly?

"It is a neuromuscular disorder, meaning it affects both the neurological system and the muscles. The disease is degenerative and eventually results in nerve damage. The initial symptoms typically manifest around the age of 20: the patient experiences loss of strength in the limbs. The disease affects approximately 1 in 3,000 people."

What causes CMT?

"To date we still haven't identified what goes wrong exactly. We do know, however, that the disease is brought on by a mutated gene. In other words, it is hereditary. But there are many kinds and every subtype has a different genetic cause."

"Type 1 affects the insulation layer around the nerve so that it can no longer transmit signals to the muscle. The insulation layer or conductive thread is called the myelin sheath: compare it to the plastic layer that insulates an electric wire. With type 2 the nerve itself is affected."

Is the disease curable?

"Since we don't yet understand the disease there is no known cure. The only thing CMT patients can do is go to a physical therapist to maintain function. However, the disease has a severe impact on quality of life and so far there are no prospects for a better life. That is why we want to discover the workings of the disease."

What does your research involve exactly?

"We have succeeded in imitating the insulation layer or myelin sheath. That is the layer around the nerve that is affected in CMT type 1 patients. A specific type of cells is responsible for this layer: the Schwann cells. We have discovered that stem cells from wisdom teeth can be converted into Schwann cells. That is quite unique because few cells suit this purpose. Thanks to this discovery we are now able to imitate the genetic background of the disease. Our initial results look very promising: we can imitate the genetic defect in the Schwann cells."

Stem cell research plays a pivotal role in the Biomedical Research Institute (BIOMED) of Hasselt University. Apart from the disease CMT, Esther Wolfs and her colleagues are also conducting research into stem cell therapies to combat tumours. Chemotherapy, one of the most common forms of cancer treatment, attacks the entire body whereas stem cell therapy would only target the tumour itself.



What is so special about stem cell research in wisdom teeth?

"Our ability to convert stem cells from wisdom teeth into Schwann cells offers a great advantage in that Schwann cells in humans cannot be extracted through puncture because you automatically remove bits of nerve as well. No one voluntarily donates nerves."

"The new procedure is also much less invasive than, for instance, stem cell research through a bone marrow puncture, which is very painful. Wisdom teeth are readily available: after removal they become medical waste. And a third advantage: thanks to those wisdom teeth we can work on human subjects, which considerably reduces animal testing."

How unique is the research?

"Research into the disease has been carried out in the past but no study ever made it past the preclinical trials. No theories have ever been substantiated with human material. That is also why all studies into potential therapies get bogged down. We are the only research group in the world that is trying to understand the disease using stem cells from wisdom teeth. As soon as we fully understand the disease we can start thinking about different therapies to cure it."



WATCH THE VIDEO

Three in four women experience vulvovaginal candidiasis at some point, otherwise known as vaginal yeast infections. In tandem with Purna Pharmaceuticals, Antwerp University has developed a drug that finally gets rid of the yeast infection completely. Until recently no such treatment existed. The new therapy will probably be marketed in 2027.

1

Why is a new treatment necessary?

Quite a few women suffer from persistent vaginal yeast infections. For one in five patients the current treatment has proven ineffective and they eventually become resistant against existing treatments. Moreover, whereas the current treatments curb the growth of the yeast infection, they do not eliminate them.

A biofilm, in other words a layer of micro-organisms, remains present around the vagina, causing the infection to flare up.

The new drug exhibits antifungal activity and does kill the yeast infection and the biofilm.

2

What are the benefits of the new treatment?

There are three major benefits. Firstly: the drug doesn't curb the infection but gets rid of it altogether. In other words, it is much more effective than any existing treatment. Secondly, persistent infections only require an ointment.

To date this is still a combination of ointment and pills but the latter can damage the liver and they can't be used during pregnancy. This absence of side effects is the third benefit of the new therapy.

3

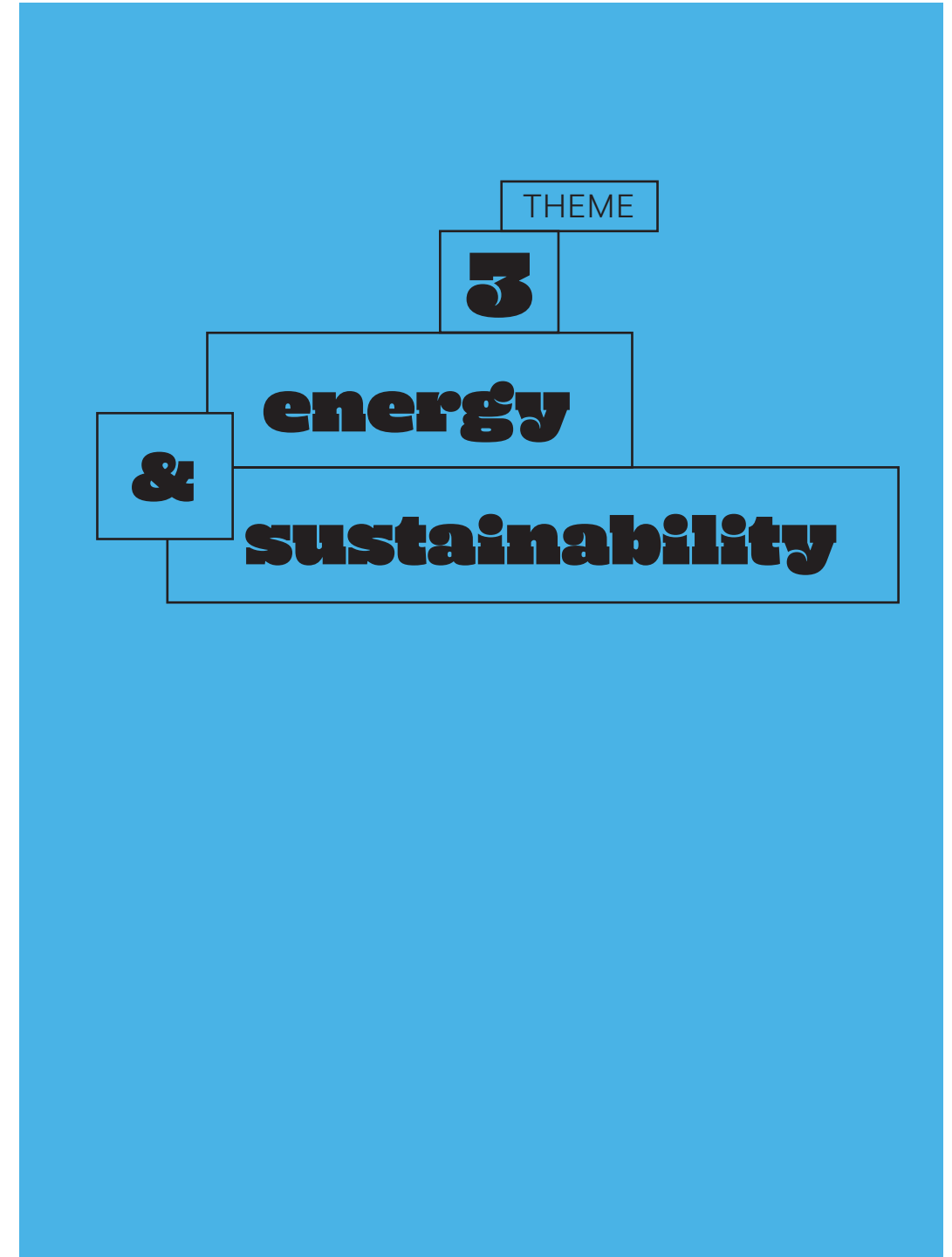
What is so innovative about the therapy?

The therapy consists of a combination of the antifungal drug miconazole, better known as Gyno-Daktarin, and other 'repurposed' molecules - a new combination of known molecules. Research results of KU Leuven have shown this combination to have very strong antifungal properties. Tests in the lab of professor Paul Cos (University of Antwerp) corroborate that theory: the drug provides a significant improvement. It is a good example of a collaboration between Flemish universities, that with the support of Purna Pharmaceuticals led to the interuniversity spin-off Purna Female Healthcare. This company is currently testing the drug on patients, it will probably go to market by 2027.

read more



Finally a treatment that fully cures vaginal yeast infections



Theoretically, using just one percent of Flanders' farming area for agrivoltaics would be enough to make the entire agricultural sector energy neutral. Research by KU Leuven has shown that agrivoltaics, or solar panels integrated over farmland, have a huge potential. A win-win for farmers and society.

The boundless potential of solar panels over farmland

Half of the Belgian territory consists of arable land. In other words, it is not far-fetched to want to examine whether this land can simultaneously be used to generate solar energy. The question is: what impact would solar panels have on the crops and their yield?

A few years ago, professor Bram Van de Poel of the Department of Biosystems of KU Leuven teamed up with professor Jan Cappelle of the research group Electrical Energy Systems and Applications (ELECTA) of Technology Campus Ghent. They are testing different configurations of solar panels in agriculture: at a pear grower and on wheat and fodder beet fields. By installing the panels at height and spreading them out, there is sufficient light to both generate energy and grow crops.

What started as a small-scale project a few years ago is now part of a European project that aims to monitor the trial fields for a number of years yet. "In the European follow-up project we want to translate our research into practice even more efficiently", professor Bram Van de Poel explains. That is why the researchers are working with, amongst others, the Proefcentrum Fruitteelt pc-fruit vzw (Test Centre for Fruit Growing), which specialises in applied research.



Beneficial for the pear grower

Two years of testing in a pear orchard resulted in the following knowledge: 16 percent loss in yield but no quality loss. "The pears were slightly smaller in size but that's acceptable. This is because the loss in weight yield is more than compensated by the extra energy yield of the solar panels. This is beneficial for the pear grower because selling electricity is more lucrative these days than selling fruit and vegetables."

A major challenge is finding the ideal positioning of the solar panels. This is easier with permanent crops, such as pear trees or other orchard trees. "This enables you to find a setup that is little invasive. In our trial project we replaced the hail nets that protect the pear trees with semi-transparent solar panels." On fields with crop rotation it's a different story because every crop will react differently to the solar panels. For crop rotation vertical solar panels are currently being tested as a potential elegant solution.

Together with Jan Cappelle's research group Bram Van de Poel and his team looked for solutions. "Computer models enable us to use 3D simulations to find different solar panel configurations: with minimum yield loss, maximum crop protection and an interesting financial return from the solar panels. Those configurations are currently being tested on two trial fields with wheat and fodder beets."

Solar panels create a favourable microclimate

So for the pears there is a slight yield loss but on the other hand the researchers noticed the solar panels also had beneficial effects. Bram Van de Poel: "Pear trees under solar panels are more resistant to drought and the fruit is less prone to sunburn. With springtime

frost, temperatures under the solar panels are half a degree higher: that can mean the difference between crop loss due to frost damage or no crop loss. With our research and computer simulations we are looking for synergies that bolster these beneficial effects."

A great deal of interest from the field

These positive results have been generating a great deal of interest: from farmers but also from other interested parties. "Businesses are often located next to farmland. They have a high energy requirement but maybe their roof area is already covered in solar panels. In such cases a partnership with their neighbouring farmer is an interesting option to make their energy use more sustainable. We also work with energy and civic cooperatives that invest in green energy together. Thanks to the new legislation on sharing power you can now invest in a solar park together."

Legislative framework is lagging behind

For the time being this is limited to research because there is an important obstacle standing in the way of dual land use: the legislative framework. "Some farmers want to invest in agrivoltaics today but right now we have to disappoint them. The legislative framework is not fully in place. But we're getting there. More and more policy makers are catching on to the benefits of agrivoltaics. We are a strong advocate of a guideline framework that provides clarity so farmers and companies can get started on agrivoltaics."

Immense potential

But would agrivoltaics really make that much of a difference? Bram Van de Poel has no doubt. "This has been confirmed by our calculations. Using just one percent of Flanders' farming area for agrivoltaics would be enough to make the entire agricultural sector energy neutral. And that would still leave 99 percent. So the potential is boundless."

A solution to the climate crisis? Recycle and reuse CO₂

1. D-CRBN



It is one of the hottest topics right now: how do we tackle the climate crisis? By tackling CO₂ emissions. Two spin-offs of the University of Antwerp, **D-CRBN** and **Oxylum**, have identified a solution: capturing CO₂ from the air and recycling it. Businesses can then use that new raw material in their processes.

What do you do exactly?

David Ziegler, CCO of D-CRBN: "We recycle CO₂ and convert it into CO using plasma technology. We generate a lightning bolt that splices the molecules and makes them fit for use again. Companies can use this CO (carbon monoxide) to produce fuels, plastic or even steel."

Why is it so innovative?

"The way in which we do this is innovative in itself. Although plasma technology has existed for more than a century, we are the only ones to use it in such an energy-efficient manner, making it extremely interesting for industrial-scale applications."

How is that coming along?

"We started an ICON project (Interdisciplinary Collaborative Research) in conjunction with Catalisti and VLAIO (Flanders Innovation & Entrepreneurship). We are building an R&D pilot line together with our industrial partners ArcelorMittal, BASF, Engie, Vopak and Talenco, and UAntwerp and VITO as our academic and research partners."

What do you dream of achieving with D-CRBN?

"By 2025 we will be launching our first commercial mobile unit capable of recycling 10,000 kg of CO₂ per year. The next step is to build large plants across the globe to convert CO₂ on an industrial scale. We are aiming for 1 million tonnes of CO₂ per year and per installation."



[read more](#)



2. OXYLUM



What do you do exactly?

Oxylum CEO Bert De Mot: "Since we have to abandon fossil fuels we manufacture alternative, climate-neutral carbon. We do this by extracting CO₂ from the air and adding electrochemical substances. This converts the CO₂ back into carbon, which can be used for industrial purposes."

Why is it so innovative?

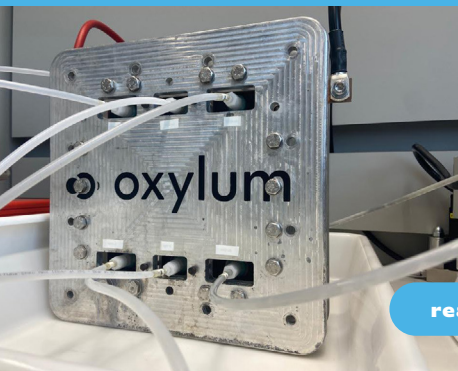
"Right now no one else is doing what we do. However, the technology has been in existence since the seventies but it was never explored further. We are developing the technique further and we are looking for a way to use it in big industries."

How is that coming along?

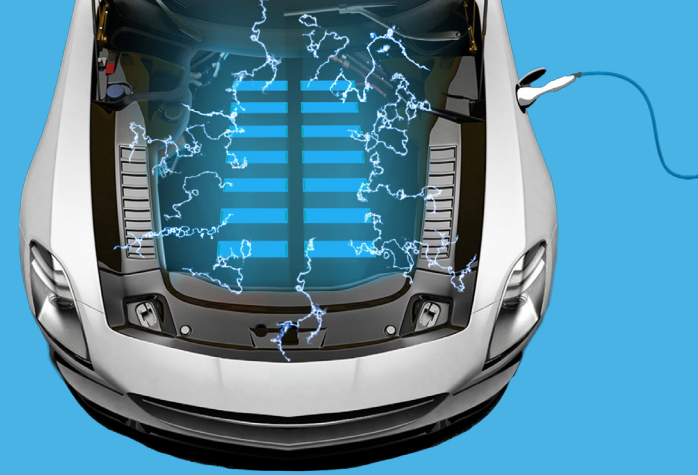
"We started approximately one year ago as a spin-off. Right now we have a lab prototype we can use to convert CO₂ into products such as formic acid, on a modest scale. Formic acid is used in cleaning agents, animal feed and textiles. We can offer them an alternative for the fossil raw material."

What do you dream of achieving with Oxylum?

"Contributing to a cleaner world that genuinely curbs climate change. We are currently working on our first pilot that is to be deployed in the port of Antwerp. Afterwards upscaling should be possible in the region of several tonnes of CO₂ per day. From there the sky is the limit."



[read more](#)



The car batteries of the future are safer

How do we make car batteries safer? A pertinent question now that the electrification of the car fleet is kicking up a gear. And it's not that simple. Together with coolant producer Artec, VUB university has gone in search of an optimal coolant that reduces or even eliminates the risk of exploding batteries.

1 What is the subject of your research?

Professor Annick Hubin of VUB research group SURF (Electrochemical & Surface Engineering): "Finding the right composition for a coolant is not that simple. Additives are added to coolants to reduce corrosion. This project focuses on finding even better alternatives. We do this by examining whether the additives that protect the combustion engine have to be adjusted to also better protect the battery casing. At the same time we are researching how to optimise the operation of the coolant."

2 How do you combine experimenting with modelling?

"We implement electrochemical research methods to determine the impact of the composition of the coolant on the behaviour of the casing material. With an electron microscope we study the surface of the material in minute detail. We are also experimenting with other additives and materials for the casing. This enables us to draw up a chemical map of where and when corrosion occurs. In addition we use computer calculations to determine how effective these additives are at dissipating heat. However, additives that improve heat dissipation could potentially promote corrosion. To avoid this we are looking for coolants with ultra-low electrical conductivity. This significantly reduces the risk of the batteries overheating and exploding."

Solar energy generated by walls, roads and even vehicles?

In the near future will we be charging our cars with solar energy from the road surface or from acoustic panels along the motorway? “The technology exists”, says professor Michaël Daenen. “Now we are looking into how it can be optimised and implemented on a large scale.”



More specifically we are talking about silicon and thin-film solar cells. The latter are lighter than classic silicon solar cells and much more flexible. “As a result they are much easier to integrate into, for instance, road surfaces or acoustic panels”, professor Michaël Daenen explains.

Longer life and higher yield

It is possible today and it exists: in the Netherlands there is a cycle path between Utrecht and Hilversum with built-in solar cells, and in the French Normandy region there's a stretch of photovoltaic motorway. “Those are demo projects”, Michaël clarifies. “They are still too expensive and not always profitable.”

The Rolling Solar project has made strides in making the technology easier to implement. The project is a collaboration between a number of research institutions, such as imo-imomec of Hasselt University, and a number of industrial partners from Germany, the Netherlands and Belgium. This past year they have been focusing on the different solar technologies in acoustic panels as they are the closest to commercial application.

Flexible materials that ‘fit’ everywhere

“We took into account the different stress factors such as sunlight, moisture, temperature and vibrations, and we mapped them out by integrating smart sensors”, he explains. “This enables us to predict the life and yield of the panels with greater accuracy.”

Based on these data they optimised the models in conjunction with a number of partners, including imec. “From a technological standpoint we have all the parts required to integrate the solar panels into building materials, even in larger surfaces. These flexible materials with thin-film solar cells can even be integrated into vehicles.”

Benefits of thin-film solar technology

Thin-film solar cells come with a range of benefits. Integration is carried out in the production stage, avoiding any additional installation costs. “And it saves room”, says Michaël. “That’s really convenient

in a country where open space comes at a premium. We do have a very extensive road infrastructure and that can help us expand the infrastructure of electric charging points on a large scale.”

As a result, the generated energy would be available in the right spot: EVs get energy from the road surface or the acoustic panels, and cycle paths can be lit using locally stored solar energy. The photovoltaic motorway in France powers the street lighting in the nearby village of 3,400 residents.

And finally, Michaël emphasises there is also an architectural benefit: “They can be processed in an aesthetically pleasing way or made to blend seamlessly into building structures. Companies are increasingly asking for roof tiles with integrated solar panels.”

Solving practical problems

Technologically it is feasible. The benefits are obvious, the need exists. But still demand is lagging behind. For now, that is. Michaël: “It’s only logical because supply is not up to par yet. Once we make the product more accessible, demand will follow suit. And the higher the demand, the lower the production costs.”

That is why with the assistance of local and industrial partners he is currently looking into a number of practical issues with the follow-up project Solar EMR. They are answering questions such as: how can we transport the panels if we integrate them into kilometres-long acoustic panelling? Can charging points be installed along the motorway? And what about the legislative framework: who owns public installations, who maintains them, who is insured, etc. “We also establish business models: can businesses resell solar energy and make money that way?”

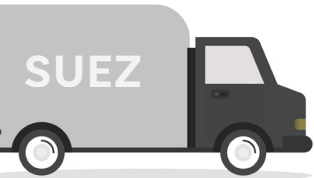
At the same time the project strives to create awareness in order to gradually conquer the market with thin-film solar cells. When these innovative applications achieve a large-scale breakthrough, this could make a world of difference to the climate.

Waste as a raw materials source: fast analysis makes it possible

Due to the scarcity in (raw) materials, businesses are increasingly eyeing their own waste streams as a potential source of raw materials. But how to determine which components of those waste streams are still useful?

Until now this was an expensive and time-consuming process because laboratories need time to analyse samples. Charamba, a joint project of Ghent University and VITO, has developed a less complex solution that uses cameras. So how does it work?

Charamba focuses on 'characterise-to-sort'. This is a characterisation device that identifies individual waste particles by combining different sensors. As we speak, the researchers are scaling up the technology for industrial applications.



1 SUEZ and Umicore are transporting truckloads of waste to Charamba. With the naked eye it is very hard to tell one particle from the next.

2 The problem is often that the particles overlap instead of being neatly juxtaposed. To distinguish one from the other it takes three cameras.

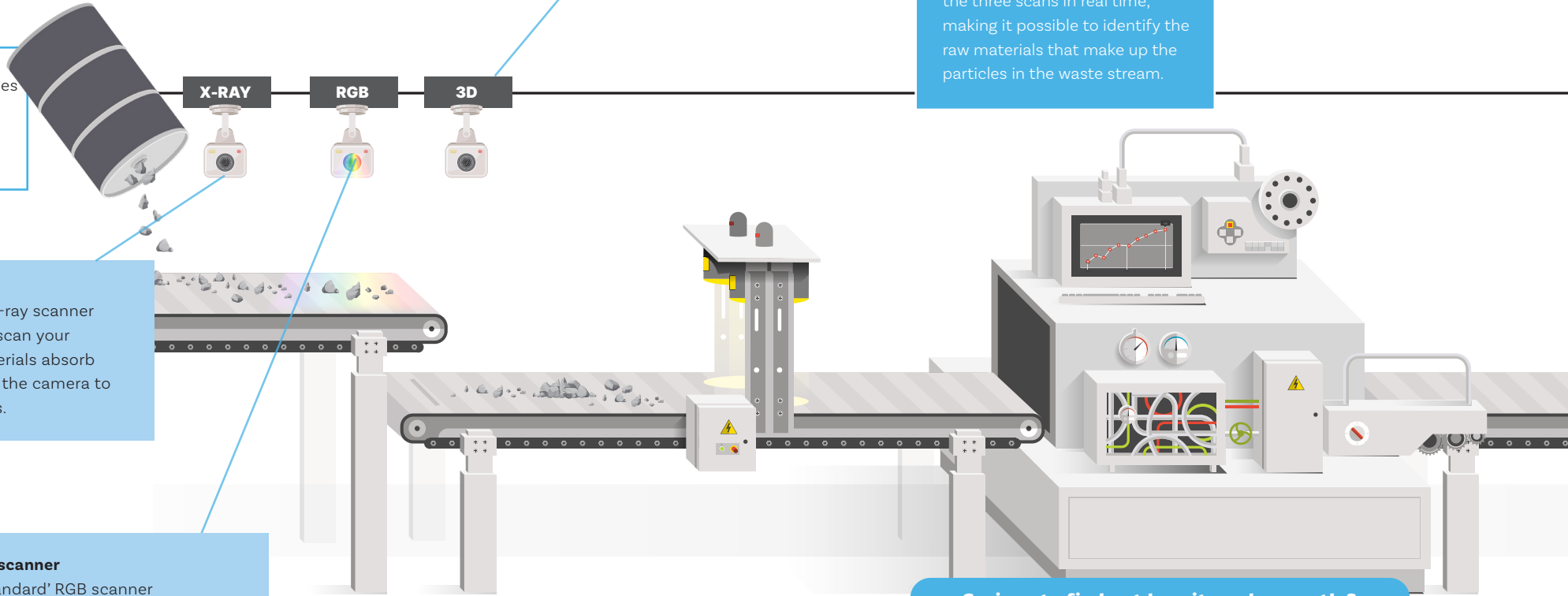
X-ray scanner
First the waste passes under an X-ray scanner comparable to the cameras that scan your luggage at any airport. Some materials absorb X-rays more than others, allowing the camera to distinguish the different materials.

RGB scanner
A 'standard' RGB scanner photographs the particles to identify their colour.

3D scanner
To get a complete picture of the particle the 3D camera scans its dimensions.

3 Subsequently the information collected by all three cameras is sent to a computer. Using machine learning artificial intelligence (AI), the computer assembles the three scans in real time, making it possible to identify the raw materials that make up the particles in the waste stream.

4 The waste is sorted and identified as gold, silver, iron, copper, ... that can be reused as a raw material.



Curious to find out how it works exactly?



THEME

4

digitalisation

&

technology

How often you fill up, when your car is due for maintenance and even which windshield repair company your insurer reimburses: presently all of this information will be available in a single practical app. This is the result of a close collaboration between the KdG University of Applied Sciences and Arts (AUHA) and spin-off LinkedCar of entrepreneur Mario Schraepen.

1 What prompted the development of the app?

LinkedCar collects all info about your vehicle and makes the life of car users easier. Right now, if you need a piece of information concerning your vehicle, you look it up: in your car's paperwork, your insurance contract or the app of your car dealer. Users are not always sure where to find specific information.

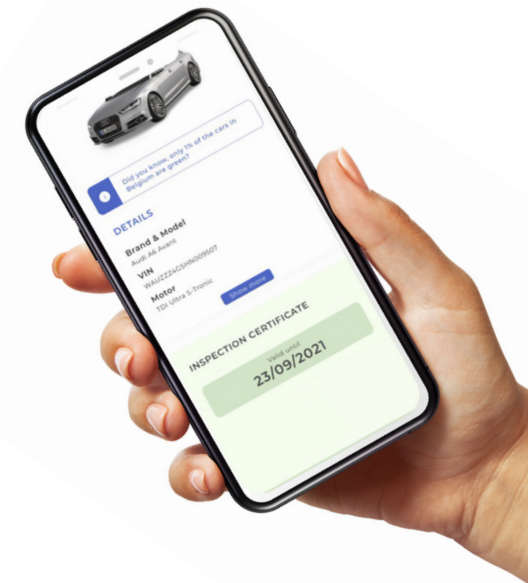
2 What is the solution you developed?

Vehicles such as cars and e-bikes already generate a host of information. Manufacturers collect everything, even address lists from your smartphone.

- » The Expertise Centre Sustainable Mobility of Karel de Grote university college is developing a unique algorithm to decipher this vehicle data and make it accessible to users. This means LinkedCar receives a wealth of real-time information and up-to-date vehicle data. The app not only collects all vehicle-related data but also that of different stakeholders. Just think of your insurer, the manufacturer or the leasing company. This way you are always up to date on the conditions imposed by your insurer or leasing company.
- » The app gives you control of your own data: you choose with whom you share all this information. In exchange you get a string of advantages, such as cheaper insurance or a fuel discount.

3 How do you see the future of the app?

The app will become available to the public in the second quarter of 2023. At the moment the app is being fine-tuned in conjunction with companies and users in Australia. In Belgium ten companies have so far jumped on the bandwagon: from lease companies and insurers to manufacturers and suppliers of charging stations.


[read more](#)


A single app that collects all data on your vehicle

Schoenen Torfs, VRT, Tomorrowland and Kinepolis are just a few of the organisations in the customer portfolio of ethical hacker platform Intigrity. This spin-off of KU Leuven that battles cybercrime worldwide is building on the expertise of the DistriNet lab under the direction of professor Wouter Joosen.

KU Leuven spin-off supports fight against cybercrime

For over 20 years, the DistriNet research group of KU Leuven has been the expert par excellence in software cybersecurity. Their researchers were already engaging in ethical hacking before the term had even been coined. Therefore it is not surprising that the founders of Intigrity approached DistriNet with the request to set up a safe platform that is robust against all kinds of cyberproblems.

Robust against attacks

The hackers at Intigrity go in search of the weak spots in the digital systems of businesses and (government) organisations that go undetected by the internal IT staff, developers and testers. Because of this delicate information, Intigrity's own platform must meet the highest security standards. Professor Joosen: "We helped ensure that the platform meets the strictest security standards. Companies that wish to work with Intigrity also want guarantees, for instance that the ethical hackers only have access to the data they need for their work. Moreover, the hackers' reports on the platform expose vulnerabilities in black and white: this type of sensitive information must not fall into the wrong hands."

Taking a different perspective

Why don't ICT manufacturers carry out their own security tests on their online services?

"They are aware that their own know-how is insufficient. External actors take a different perspective and often identify weaknesses you'd never find yourself."

Also Intigrity did not fully set up the security of their platform internally. Under the direction of professor Lieven Desmet, KU Leuven played a crucial role in the safety architecture of the Intigrity platform in the early years.

European market leader

The collaboration acted as a catalyst: before long Intigrity gained the trust of dozens of Belgian and international customers. In just a few years' time, the spin-off built a network of more than 50,000 ethical hackers worldwide. "Last spring a major fundraising round was held in the aim of becoming the European market leader", says professor Joosen.

The fact that Intigrity was able to grow in such a short time not only has to do with the maturity of the platform and its excellent service quality, but mainly with the maturity of the market. "Acceptance is important. The customers must be prepared to abandon their old way of working and adopt this new approach. But it's early days yet"

First European network of quantum computers

According to Hasselt University professor Milos Nesladek the expectation is that quantum computers will reshape the world. "Their immense computing power will make calculations possible that supercomputers would need hundreds or even thousands of years to complete. Some mathematical problems are even insolvable with classic computers." With the LUMI-Q project he and his colleagues are contributing to the very first European quantum computer network.

1

Why is a quantum computer network necessary?

Such a network is a genuine game changer in terms of innovation and research. Quantum computers are the future. Why? They make far more complex calculations than supercomputers, which are incapable of processing excessive data volumes. A quantum computer needs just seconds to perform calculations that take other computers thousands of years, a concept known as 'quantum supremacy'. That is because they consist of qubits, a unit of quantum information that can simultaneously take on a huge number of values at once, exponentially proportional to the number of qubits. This sets them apart from classic computers, which consist of bits that have value 0 or 1.

2

How is the network being set up?

The European Union is investing one hundred million in the EuroHPC Joint Undertaking, a public-private partnership created to bolster the European position in the area of supercomputers. The LUMI-Q project is part of that programme: the very first European network of quantum computers and classic supercomputers. In the coming years Hasselt University will develop software and algorithms to carry out specific computations.

3

When will the network be operational and for what purpose will it be used?

The quantum computers will be ready by mid-2023, at six different locations in Europe. They will be used by knowledge institutions, businesses and governments. The computers are capable of processing extremely large data volumes, designing new molecules for medicines, and modelling catalysts or other functional materials.



Photonics, or the science and technology of light, plays a crucial role in the challenges we face as a society. However, many companies, and especially SMEs, consider innovations that use this technology too expensive. That is why the European knowledge platform PhotonHub Europe brings together 56 partner and research institutions to assist companies with photonics expertise and technology. PhotonHub is coordinated by the B-PHOT research and innovation team of VUB.

The idea behind PhotonHub? Flipped technology transfer: instead of commercialising technology, PhotonHub listens to the innovation needs of companies and assembles teams consisting of leading researchers.

Strong collaborations

And that leads to strong collaborations, as was the case with ERIKS, a supplier of mechanical engineering components. "In our 80-year existence, we have built tremendous expertise in the area of flat seals", says managing director Sytze Nijman.

"But the developments in the areas of sensing and digitalisation are coming so fast that we went in search of a partner to help us bring the best possible solution to market in the shortest possible time span." In no time, the collaboration with B-PHOT resulted in a feasibility study, followed by a demonstrator. Thanks to the financial support of VLAIO, the company embarked on a path of in-depth development.

VUB has been acting as the coordinator since 2011, back when the first European trial project Actmost was launched.

Photonics technology and innovation expertise more accessible thanks to knowledge platform



WATCH THE VIDEO

In recent years the scope was expanded. Companies can call on PhotonHub for feasibility studies, prototyping, the start-up of pilot production, financial and business coaching, guidance towards scaleup, contact with manufacturers, ...

Companies are also welcome at B-PHOT's demo and experience centres to gain useful experience on the research group's equipment.

Future guaranteed

With 19 million euros it is one of the biggest European projects on photonics. And the future is looking bright because thanks to the Flemish government's Vlaamse Veerkracht recovery plan, the platform will continue as PhotonHub Association.

[read more](#)



Not science fiction but a feat of technology

THESE GLASSES LET USERS ADJUST THE STRENGTH OF THE LENSES THEMSELVES

Those who are both short and long-sighted – like many over-45s – know that progressive glasses narrow your field of vision due to the distortion in the lenses. A new technology authored by Morrow Eyewear, a spin-off of Ghent University, now offers a solution: glasses that can alternate between two strengths.

“What if I took the LCD technology such as in a TV and used it in a lens?” For Jelle De Smet, at the time just another student at the Faculty of Engineering and Architecture at Ghent University, this question was the start of everything. Very early on he knew that he wanted to explore this further. He took an entrepreneurship course and his doctoral research focused on this LCD technology. Today he is the Chief Technology Officer (CTO) at Morrow Eyewear, a Ghent-based company that manufactures autofocal glasses.

So in the end you decided against a lens. You opted for glasses instead?

Jelle De Smet, founder of Morrow Eyewear: “In the early stages of my doctoral research I wondered: what can I use this for? I realised it would take years of research before a contact lens with LCD technology would be ready for market. Using that technology in glasses is much easier because glasses don't come into direct contact with your eye and you can therefore use a wider range of materials.”

So how does it work?

“Our autofocal glasses consist of two ultraprecise glasses that are cut to size. In between is our lens-in-foil with liquid crystals, the same material that is used in television sets. On the side is a small and discrete button that sends a small electric current to the glass. This changes the refraction of the light and therefore also the glass you are looking through. This way the simple push of a button is all that's required to electronically change the strength of the lenses.”

But progressive glasses also let you see near and far, don't they?

“Yes, but the problem with progressive glasses is the significant distortion on the edges, narrowing the wearer's field of vision. With our technology you can simply switch between both strengths, your field of vision is not compromised and you enjoy much greater visual comfort.”

Our technology could be a genuine breakthrough in the glasses landscape.

How revolutionary is this invention?

“I believe that our technology could be a genuine breakthrough in the glasses landscape. You should know that when it comes to glasses there have been no true innovations in the last seventy years.”

Does this motivate you?

“Absolutely. The idea that you're working on a new, meaningful product keeps me going on difficult days.”

How far along is the project?

“The product was marketed last year. Meanwhile we have made a second version taking into account customer feedback. We are constantly renewing and improving the technology.”

What are the next steps?

“We hope to add additional functionalities in the future. One example would be connectivity with your mobile so you can use an app to monitor your own reading behaviour. Or perhaps you could even read your WhatsApp messages on your glasses. And that's just the beginning.”

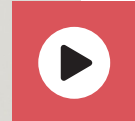
That almost sounds like science fiction.

“(laughs) I assure you it's not. It's optics combined with materials science and electronics.”

morroweyewear.com



WATCH THE VIDEO



As of 2024 a driving assistant will be mandatory in the EU to avoid blind spot accidents on newly registered trucks. Active Sideguard™ by VUB university spin-off eXia is such a driving assistant. It is the first in the world to be based on a unique electrostatic sensor principle, giving it a leg up on other technologies.

1 What challenge does Active Sideguard™ tackle?

Researcher and co-founder Bart Truyen: “It is virtually impossible for truck drivers to correctly process the abundance of visual information they have to deal with: 7 mirrors, plus direct visual contact, plus screen info from the blind spot monitor, ... Blind spot sensors are the answer: they guard the blind spot zone autonomously, and they warn the driver visually and aurally of any danger that is detected.”

2 What are the benefits of your technology?

“Our technology is very robust in the face of challenging weather conditions, dirt and arduous working conditions. Thanks to their water and dirt-repellent coating our sensors will even survive a cement layer. More conventional radar and ultrasonic sensors are more sensitive to interference. Moreover, our sensor detects obstacles of various heights, regardless of the mounting height of the sensors.”

3 Does this technology also have a future in other areas?

“Absolutely! At the moment an interesting project is underway for the protection of autonomous transport robots in warehouses. There is always a safety risk, especially in a work environment where people are also present. Our sensors are more effective there than the existing laser scanners. In addition, eXia is also developing sensor technology for a new generation of automatic lawnmowers. The sensors are meant to prevent animal suffering because now many accidents take place involving smaller animals such as hedgehogs. Exia's sensors look ‘through’ the lawn to spot smaller obstacles on time.”

Blind spot sensors save lives



[read more](#)



THEME

5

society

Temporary and sustainable housing for the homeless

Many cities are facing a huge shortage of affordable quality housing. In Brussels they thought that perhaps a creative solution could provide the answer: use the city's vacant plots to set up temporary housing for the homeless. The Solidary Mobile Housing project was born, in collaboration with the Faculty of Architecture of KU Leuven.

Housing as a verb through co-creation **1**

The design of the mobile housing units involved all stakeholders in a process of co-creation. This includes the future occupants, a group of eight homeless people. During the co-creation phase a social model was developed: housing as a verb. In this model the dwelling is an instrument used to validate the future occupants through, for instance, individual and collective guidance, job coaching and the acquisition of communication skills.



Students involved in every stage **2**

Students of the Faculty of Architecture of KU Leuven are involved in every stage of this participatory action research. The students actively contribute to developing solutions with an added social value while building invaluable practical experience on the various aspects of the job.



Expansion of the concept to 'housing as a service' **4**

The Solidary Mobile Housing partners are currently examining whether and how the model can be implemented commercially within the concept of 'housing as a service': offering the modular dwellings as a 'service'. By up-scaling and marketing this service the partners aim to use part of the commercial profit for the social project.



Introduction of new learning paths **3**

Based on the experiences from this project, the Faculty of Architecture of KU Leuven introduced its first two official 'service learning' subjects in 2020. These are subjects where students contribute to society through their engagement in a certain community. At the moment new learning paths are being developed and more similar subjects are being rolled out that not only train students into academically skilled individuals but that also help them grow into engaged and critical citizens.

[read more](#)



Launched in 2016, Solidary Mobile Housing is a project by SAAMO Brussels, the Faculty of Architecture of KU Leuven and the Centre for General Well-Being Brussels (CAW).

Ellen gives non-native speakers of Dutch access to more understandable healthcare

Carers who help non-native speakers of Dutch often face a single but huge obstacle: communication.

Together with her team, Ghent University professor **Ellen Van Praet** of the faculty Translation, Interpreting and Communication developed the app 'HET KLIKT!' to help break down the language barrier.

Your chosen field is language in the healthcare sector. How did you end up there?

"Approximately a decade ago I came into contact with the Agentschap Integratie en Inburgering (Agency for Integration and Civic Integration) of the Flemish government. Together with my research team I was given the opportunity to analyse footage of consultations with non-native speaker clients of the Agentschap Opgroeien (Agency Growing Up), which was still called Kind & Gezin (Child and Family) at the time. That footage made it painfully clear that communication is often extremely difficult in spite of the best efforts of care providers."

You and your team are working on a solution?

"Correct. For several years we've been developing 'HET KLIKT!'; a web application

that simplifies the communication between care providers and non-native speakers."

How does it work?

"Care providers can use the app to conduct a classic preliminary interview. In addition to a dictionary functionality the app also translates often used sentences. The app makes it easy to ask basic questions such as 'do you have a fever?' or 'can you show me where it hurts?'. There is also a section with illustrations enabling care providers to establish a tailor-made narrative. Everything in the app is supported with visuals and recorded by native speakers."

So it's more than just a translation app?

"Absolutely. Translation apps are useful but they are not made to support medical conversations because they can only translate fairly standard language. With 'HET KLIKT!' care providers can easily adapt to the patient's needs."

Does this mean an interpreter is not an option?

"Theoretically yes but due to rising demand for care in a growing number of languages there is often a shortage of interpreters. Moreover, a professional interpreter costs almost fifty euros per hour, which is six times more since 2018. The logical reaction is that patients often call on informal interpreters. These can be brothers, sisters or even children. However, this excludes all discretion and information is often lost. Not only is this potentially dangerous, it also compromises quality care for non-native speakers."

What is the current state of the research?

"We have completed an application with two topics linked to children. One is about toilet-training and the other about administering medication. These topics are available in seven languages: Arabic, English, Farsi, French, Turkish, Ukrainian and Dutch. In the future we will focus on other topics and languages and we will continue to test the application with the assistance of care providers. We will also look for commercial partners willing to conclude a licensing agreement."

What is your main motivation?

"Doing meaningful work is very motivating. I find the area of tension between fundamental and applied research very challenging. I like to translate research results into practical usability for society at large. I would like to see the process speed up because time is of the essence."



[read more](#)



With 'HET KLIKT!' care providers can easily adapt to the patient's needs.

How to better prepare young drivers for the road?

1

Why were the driver training course and the driving test evaluated?

Better driving training should better prepare young drivers for the road and bring down accident statistics. Research has shown they are involved in more accidents because they are quicker to overestimate their driving skills. That is why the Flemish Government wants to evaluate the driver training in depth and modernise it. The Institute for Mobility of Hasselt University was tasked with the assignment.

2

How did you tackle that analysis?

The IMOB queried 5,500 people on the measures, from young drivers and aspiring drivers to supervisors, examiners and driving instructors. Professional organisations such as GOCA Vlaanderen (the expertise centre for car inspection) and the VSV (Flemish Foundation for Traffic Knowledge) were also involved in the survey. In addition, the institute analysed a wealth of information, such as pass rates and the number of road accidents, and also conducted an in-depth scientific literature study on the latest insights.

3

What are the key recommendations?

- » Provide one centralised overview of all support resources (such as a website) that aspiring drivers can access. Why? Research has shown that awareness of these resources is often lacking or comes to late. They can do this, for instance, when they book a theoretical and practical driving test, or on request through their driving instructor.
- » Introduce a dedicate training session for the supervisors to refresh their knowledge of the Highway Code and for useful tips. They can do this online or via a brochure, for instance.*
- » Introduce a longer practice period of at least five months as an admission requirement for the practical exam. International statistics show this brings down the number of accidents.*

The Flemish driver training and the driving test were revamped in 2017. The Flemish Government commissioned an in-depth evaluation from the IMOB, the Institute for Mobility of Hasselt University. More than 50 recommendations were submitted to the Flemish Government. Professor Tom Brijs is more than happy to clarify them.



*Measures two and three have meanwhile been approved by the Flemish Government

The bridge between carers: Zipster makes it easy for care providers to refer patients

The lower the threshold to psychosocial support, the better. That is the basic principle of Zipster, a project by software engineer Stijn Coolbrandt and the University of Antwerp. On this digital referral platform care providers need just a few clicks to bring their patients into contact with local welfare actors.

How does Zipster work?

Zipster founder Stijn Coolbrandt: "If care providers suspect their patients are in need of psychosocial support they can turn to the platform, where they can go over a short questionnaire with the patient to quickly detect the underlying issue. Subsequently Zipster proposes organisations nearby that can help. Care providers can refer the patient, subject to his or her permission. On the platform they can also monitor the eventual guidance the patient receives."

What is Zipster's biggest asset?

"Zipster lowers the threshold to refer patients to psychosocial support so they can contact the most suitable organisations much faster. Just think of local Public Centres for Social Welfare (OCMW) and CAWs (Centres for General Welfare), or centres that focus on poverty, addiction or employment. Because mental health is at least as important as physical health. Indeed, the more

psychosocial issues, the bigger the odds you will also develop physical problems. We want to address this issue."

What is the added value for scientific research?

Professors Hilde Philips and Hilde Bastiaens (Faculty of Medicine and Health Sciences, University of Antwerp): "We are looking to see what data on the platform we can use to evaluate the referrals. This project is obviously interesting to us because we can research the social added value of the referrals. What do the referrals achieve? Have they effectively improved? The answers to these questions will enable us to upgrade healthcare."

WATCH THE VIDEO


[read more](#)


Facts & figures

19,853
Number of researchers on 1 February 2022 (in FTE)¹

€157,532,476
Revenue from European programmes, 2021⁶

12
Number of science parks, 2022¹⁰

142
Number of business developers, 2022⁹

7,681
Number of new research contracts, 2021²

14,000+
Number of employees at the spin-offs, 2021⁵

46
HEALTHCARE

184
Number of awarded patents, 2021³

14
Number of incubators, 2022¹¹

16
ENGINEERING

12
FOOD & AGRICULTURE

1,668
Number of active patent families in portfolio, 2021⁵

10
LOGISTICS & MOBILITY

6
CLEANTECH & ENERGY

26
ICT & ELECTRONICS

4
EXACT AND APPLIED SCIENCES

€327,026,709
Revenue from contract research with the private sector, 2021⁴

450
Cumulative number of spin-offs established, 2021⁷

14
MATERIALS & CHEMISTRY

8
SOCIAL SCIENCES

Sources
 1 VLIR staff statistics
 2-5 TTOs
 3 ECOOM
 4-6 Universities' income statements
 7-8-9 TTOs
 10 TTOs (some of these, e.g. Leuven Noord science park, are still in development)
 11 TTOs (some of these, e.g. Innovation Cradle Leuven, are still in development)

COLOPHON

'A world of difference' has been published on paper and online and can be downloaded from the website:

www.ttoflanders.be

Editing:

The Fat Lady

Responsible Publisher:

Jurgen Joossens,
head of University of
Antwerp Valorisation Office
Middelheimlaan 1,
2020 Antwerp

TTO CONTACT POINTS

KU Leuven

KU Leuven Research & Development
Ird@kuleuven.be
www.kuleuven.be/ird

Ghent University

UGent TechTransfer
techtransfer@ugent.be
www.ugent.be/techtransfer

Hasselt University

UHasselt Tech Transfer Office
techtransfer@uhasselt.be
www.uhasselt.be/techtransfer

University of Antwerp

University of Antwerp Valorisation Office
valorisatie@uantwerpen.be
www.uantwerpen.be/forcompanies

Free University of Brussels (VUB)

VUB TechTransfer
techtransfer@vub.be
www.vubtechtransfer.be

THE TTO'S, AS THE POINT OF CONTACT FOR COLLABORATION WITH THE RESEARCH WORLD

The technology transfer offices stimulate the exchange of knowledge and technologies from the Flemish universities with business and society. Through the joint initiative TTO Flanders, the TTOs offer a unique portal to this knowledge and bridge the gap between science and business.

The TTOs are active on a daily basis in:

Business development

The technology transfer officers and business developers in the IOF (Industrial Research Fund) act as a unique point of contact for companies.

Research collaboration

The universities meet the R&D needs of companies with different types of collaboration.

Management of intellectual property

The TTOs protect intellectual property and license university technology.

Supporting regional development

The TTOs are closely involved in launching and managing incubators and science parks.

Creation of innovative spin-offs

The TTOs guide researchers in translating innovative research results into a fully-fledged enterprise.

Access to incubation and seed capital

The TTOs give assistance in searching for funding of innovative research projects in an early development stage.

Promotion of entrepreneurship and innovation

The TTOs offer training and coaching, and develop network initiatives and technology clusters.

Various sources have been used for this publication, along with information provided by the tech transfer offices (TTOs) of the five Flemish universities. The information in the 'Facts & figures' section is a snapshot, which was up to date at the time of publication. TTO is not responsible for any damage, losses or any other consequences caused by using the data, information or advice in this publication.

