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Horizon 2020

Achievements

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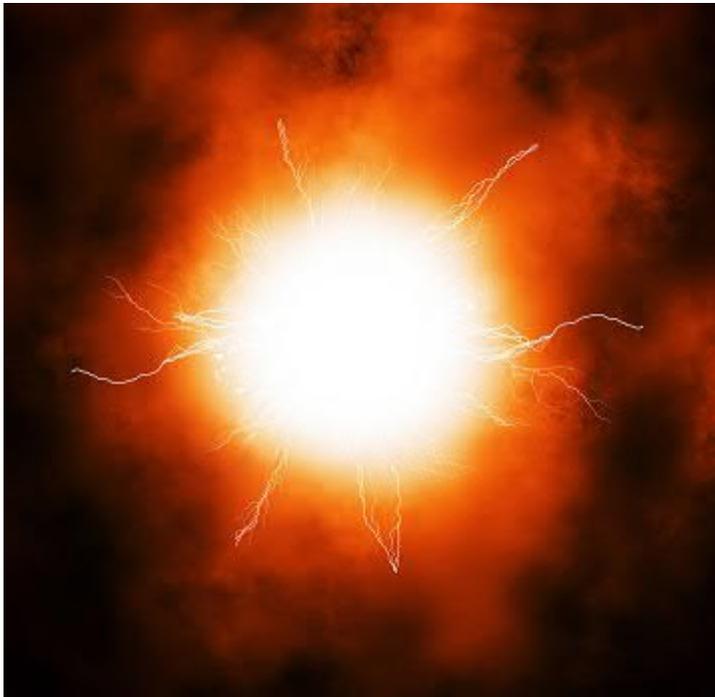
Project information

Display date:

Date

Highlight topic:

Tuesday, 28 July, 2015



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/fotolia_60952381_subscription_s_9935_0.jpg)

Harnessing nuclear fusion could generate unlimited, sustainable energy. An EU-funded project has helped advance atomic modelling in preparation for a future fusion reactor.

Since the 1920s, scientists have known that it is possible to fuse hydrogen isotopes - versions of hydrogen that contain extra neutrons - to release energy without creating carbon emissions or excessive radioactive waste. The promise of unlimited clean energy is driving a

An official EIR^L ^{Just} ^{omrTierCia,} ⁱ ^{Via} ⁱ ^e fusion reactors that could meet the world's growing demand for secure, safe energy.

The ADAS-EU (<http://www.adas-fusion.eu/>) project has helped researchers to model and measure the radiating properties of atoms and ions in plasmas - extremely hot gases in which electrons are detached from their parent atoms to form ions - used for fusion. These models are essential to developing one particular type of plant, a magnetically confined fusion plasma reactor, currently being built in France within an international 30-year project, ITER.

In this type of reactor, atoms in hydrogen plasma within a magnetic field are accelerated to very high speeds so that they can collide and fuse with each other. The plasma will have to be 10 times hotter than the Sun for fusion to occur. This process releases energy that can be harnessed to generate electricity. Models from ADAS-EU are helping scientists learn how to contain the plasma, heat it and control the energy it produces.

Ultimately, ITER will produce the same amount of power as a gas-fired power station (500 MW), albeit for only a few minutes. This would prove that fusion could be a commercially viable source of energy. Actual electricity generation for continuous periods will then be realised at the next stage in the quest for commercial fusion - DEMO- the demonstration fusion power plant.

Project coordinator Hugh Summers of the University of Strathclyde in the United Kingdom says: "Researchers are trying to make plasma hot enough for long enough, and with other conditions right, for hydrogen fusion to occur." Accurate models that predict atomic processes amongst the different parts that make up the plasma are therefore crucial in developing a large-scale reactor such as ITER, he explains.

Project achievements

ADAS-EU was an extension of ADAS (the Atomic Data and Analysis Structure) - an initiative supported by European, US and other international laboratories, universities and the EU to link theoretical and experimental atomic physics in fusion research.

The four-year project worked on six themes relevant to ITER: heavy element spectroscopy, medium-weight elements, charge exchange spectroscopy, neutral beam stopping/emission, diatomic spectra and collisional-radiative models.

It supported improvements to atomic physics models around Europe by placing specialist staff in laboratories, developing training courses on ADAS modelling and data techniques and publishing data on public websites.

These improved models incorporated new atomic fusion information and modelled heavier elements than had been done previously. The project also helped manage databases of atomic data and promoted key atomic data calculation and measurement methods.

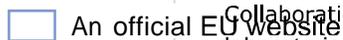
In particular, the EU-funded project helped researchers understand a number of factors influencing hydrogen atoms' behaviour in high-temperature reactors.

One was the impact of tungsten contamination. Used for the divertor, a reactor part subject to enormous heat that removes waste particles and heat from the plasma, this very hard, brittle heavy metal can release particles when plasma touches it.

A second was X-ray forbidden emissions, found in high-temperature conditions where the usual rules of atomic transitions are 'broken'. "We discovered that these carry a lot of the power of the total atomic emission," states Summers. "It helps us know what to look for to check that emissions are occurring as expected."

Sharing its new knowledge, ADAS-EU also created the OPEN-ADAS website, putting ADAS data and the work from ADAS-EU in the public domain. This has become one of the primary sources in the world for information about how atoms radiate and on interpreting spectra in plasma, says Summers.

International effort



Collaboration with the International Atomic Energy Agency and Euratom-associated laboratories was important for the project's achievements. "From its beginnings in the 1950s, European fusion energy research has always been a coordinated programme - it is very complex and investment-intensive," says Summers.

He adds that expert European university groups that contributed special knowledge to the ADAS-EU themes are now collaborating in further research into fusion power generation.

The project achieved all its objectives, he adds, "leaving the ongoing ADAS Project in excellent health, very heavily used, fully engaged with ITER, and with world-leading data and outstanding fusion modelling and analysis capabilities."

See also:

CORDIS (http://cordis.europa.eu/project/rcn/89352_en.html)

Project: ADAS for Fusion in Europe

Project Acronym: ADAS-EU

Friday, 24 July, 2015



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/fotolia_72979334_subscription_s_9929.jpg)

Increased cross-border experiences are driving Europeanisation, particularly among those with a lower level of education, say EU-funded researchers. From having a friend in another European country to online shopping, people around the continent are developing a European mindset. This, in turn, means greater European integration.

The EUCROSS (<http://www.eucross.eu/cms>) project mapped Europeans' cross-national experiences and sought to measure 'transnationalism'. While this term is often used in reference to migrants, "the European project is making everyone transnational to some extent," says project coordinator Ettore Recchi, based at Italy's University of Chieti-Pescara during EUCROSS.

The project was designed to find out whether these experiences contribute to a European identity, "a 'we' feeling". If people identify themselves with Europe, this makes for a more unified, integrated Europe rather than a sum of different nations and nationalities following national interests as a primary goal, Recchi explains.

EUCROSS assessed identification with Europe, support for the EU, solidarity with other Europeans and cosmopolitanism.

Talking transnationalism



To understand the link between experiences and mindsets, the EUCROSS team carried out telephone interviews with 6 000 randomly selected members of the general public in Denmark, Germany, Italy, Romania, Spain and the UK. These were followed by face-to-face interviews with 2 500 migrants of Romanian and Turkish origin living in these six countries.

Romanians are, proportionately, the largest group of migrants within the EU, explains Recchi, while Turks make up the largest community of non-EU citizens living in the EU.

The project found a much stronger feeling of Europeanness among Romanian than Turkish migrants, but also found similarities: "Attachment to Europe depends for both groups on not having experienced discrimination," says Recchi. If they have been victims of discrimination, there is a tendency for the migrants to distance themselves from the concept of 'Europe'.

The importance of experience

The team found that cross-border experiences - such as living or travelling in Europe or knowing someone in or from another European country - all contribute to a European identity. And the number of people with such experiences is quite high - 54 % of those surveyed (migrants not included) were familiar with another European country, while 17% have lived in one.

"I think this is huge," says Recchi. "It shows that Europe is becoming part of people's horizons."

Democratising Europeanness

"Education counts for a lot" in explaining differences between social groups, says Recchi. Highly educated people tend to be more pro-Europe, but they are also more likely to seize the opportunities created by the single market.

But interestingly, cross-border experiences have an even greater impact on creating a sense of Europeanness among persons with a lower level of education than among the more educated. Transnational experiences therefore play an important role in democratising the sense of belonging to Europe, says Recchi.

Overall, physical and personal (e.g. friends in another country) cross-border experiences were found to have more of an impact than virtual or impersonal experiences. And as physical experiences are so influential, this finding makes a strong case for encouraging intra-European mobility among more disadvantaged Europeans, says Recchi.

And Recchi has another recommendation for policymakers: don't be too obsessed with European identity.

The EUCROSS project found cross-border experiences have led to a widespread sense of living in a multicultural and borderless society. "This is more important and forward-looking than declaring oneself European," says Recchi.

Instead of focusing on creating an identity, policymakers should defend mobility, which, in the long run, will pay off in terms of social integration.

EUCROSS finished in June 2014, but the team is continuing to exploit its findings and rich data through scholarly articles.

See also:

CORDIS (http://cordis.europa.eu/project/rcn/98871_en.html)

Project:

The Europeanisation of Everyday Life: Cross-Border Practices and Transnational Identities among EU and Third-Country Citizens

Project Acronym: EUCROSS

Friday, 17 July, 2015

An official EU website



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/fotolia_86830654_subscription_s_9880_0.jpg)

Human papillomavirus has long been associated with the vast majority of cervical and anogenital cancers diagnosed worldwide, but its role in head-and-neck cancers has been less widely researched. In a landmark case study, EU-funded researchers are characterising the connection in order to advance the development of new screening and diagnostic techniques.

Bringing together teams across Europe and India with the support of the European Commission, the HPV-AHEAD (<http://hpv-ahead.iarc.fr/>) project has conducted large-scale epidemiological studies and identified biomarkers that could provide early warning for human papillomavirus-induced head-and-neck cancer (HNC), potentially helping to save thousands of lives.

HNC is the sixth most common type of cancer globally, with one of the highest fatality rates. Around 550 000 cases affecting the mouth, throat and larynx are diagnosed worldwide each year, leading to around 300 000 deaths. Alcohol consumption, smoking, poor oral hygiene and genetic features are known to be key risks for HNC development, but in the last decade another factor has emerged: human papillomavirus (HPV).

More commonly associated with anogenital malignancies, especially anal cancer in men and women and cervical cancer in women, HPV is also now believed to be responsible for approximately 25 % of head-and-neck cancers, with one type, known as HPV16, accounting for up to 95 % of cases. This is important news for HNC patients as HPV positive tumours have a better prognosis and require different therapeutic regimens.

"While risk factors such as smoking have declined in Europe and the United States in recent years, in some regions HNC rates have steadily increased, suggesting a connection with HPV infection rates," says Massimo Tommasino, the HPV-AHEAD coordinator at the Infections and Cancer Biology Group of the World Health Organisation's International Agency for Research on Cancer (IARC).

In India, where cervical cancer caused by HPV is the most common cancer among women, the incidence of HNC is the highest in the world, accounting for up to 40 % of all cancers diagnosed in the country and a third of all cases of HNC worldwide.

Screening for cancer risk

Through epidemiological studies in Europe and India, the HPV-AHEAD researchers sought to establish the overall proportion and type distribution of HPV-positive HNC, define infection and cancer incidence trends and determine whether HPV infections interact with additional HNC risk factors.

By segregating teams at different laboratories using different assays on a large number of samples from HNC patients, the HPV-AHEAD researchers were able to define accurate and efficient procedures to determine the presence of HPV infection.

Within the project, a team coordinated by Paul Brennan at IARC back-tested the approach using blood samples taken from 500 000 people more than 20 years ago for an independent study, initially funded by the European Commission (EPIC - European Prospective



Investigation into cancer (Nutrition). Their findings showed that antibodies against specific viral proteins can be detected several years before the development of a malignant lesion. In contrast, in cervical cancer the same antibodies are considered very late markers.

"The immune response to HPV infection in the mouth and throat is very different to that in the cervix. The immune system is much more active in the oral cavity so antibodies are present much sooner after infection," Tommasino explains. "This research should lead to new screening techniques for HPV-positive HNC, which would provide early warning for patients and contribute to the development of new therapies."

Knowledge, assays and other technology developed in the project have been transferred to Indian partners and fully shared among all partners. Members of the consortium are planning to continue working together on refining the results and identifying additional biomarkers for HPV-associated HNC.

"We're currently actively seeking funding to launch validation trials for new screening procedures in a clinical setting," the coordinator says.

See also:

CORDIS (http://cordis.europa.eu/project/rcn/100268_en.html)

Project:

Role of human papillomavirus infection and other co-factors in the aetiology of head and neck cancer in India and Europe

Project Acronym: HPV-AHEAD

Thursday, 16 July, 2015



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/pub_shotv2_interact_9875_0.jpg)

Controlling a TV set by pushing an invisible, yet tangible button in mid-air or projecting content onto a screen of mist - such futuristic technologies may find their way into our homes sooner than we think. First results of the EU-funded project INTERACT are already attracting a lot of interest from industry.

Just like the relatively recent advent of touch-screen technology, the technologies coming out of the INTERACT project could revolutionise the way we interact with and use electronic devices. But how can there be a sensation of touch, i.e. haptic feedback, without actually touching an object?

INTERACT project leader Sriram Subramanian of the University of Sussex, compares the effect to rock concert-goers feeling the vibrations of the bass speakers in their

“ Ultrasound is focused on the palm of the hand to create the shape of a virtual sphere.

© Bristol Interaction and Graphics group, University of Bristol, 2014

An official EU website

chest: "We are trying to recreate this experience, but in a more targeted way. At rock concerts, they play audible-frequency sounds for their audience to hear, but in the process the sounds are also making themselves felt. We, on the other hand, use ultrasound, which vibrates at a higher frequency. As a result, we can target it more precisely in such a way that you don't hear anything, but you feel it a lot more clearly."

The arrays that make this possible are composed of 20 to 200 ultrasonic transducers, similar to the ones commonly used in parking sensors for cars, for instance. The transducers emit high frequency sound waves, which create sensations on the skin of the hand when properly focused. But it is easier said than done.

"If you look at how waves propagate, every time they come into focus at a specific point, there are also many secondary focal points," Subramanian explains. "If I put my hand up in front of a device and expect feedback at a specific location, there will be additional secondary points close by. Making sure that only the primary focal point is on your hand and that the secondary ones disperse elsewhere, was a big challenge for us. But addressing this challenge has meant we can now create many focal points on your hand to give you not only points but also shapes."

Setting the industry abuzz

The idea of using speakers to create haptic feedback is not new. However, the INTERACT approach - which was not focused on one specific application, leaving room for potential customers from industry to come up with their own ideas - has kindled great interest from TV, laptop, smartphone, household appliance and car manufacturers alike.

The interest has been so great, in fact, that the project team set up a spin-off company called UltraHaptics in 2013, which has seen dramatic growth, especially over the past six months. The UltraHaptics team takes up where the INTERACT project left off, now working on bringing down the cost of the technology and making it commercially viable. At the same time, the company collaborates closely with a number of customers from different sectors to tailor UltraHaptics to their needs and integrate it into their products.

"We don't know where that will take us," says Subramanian. "Maybe after this joint development, one of them will say 'okay, let's build that product'. If that happens, optimistically speaking, such a product could be commercialised at the earliest by the end of next year or 2017. I was very honoured to obtain the prestigious ERC funding for this research, and I would be extremely happy if by the end of the INTERACT project, in October 2016, I could say 'here's the product on the shelf that you can buy!' But that is still wishful thinking at the moment."

In the meantime, INTERACT has taken its visionary work on to the displays of the future, using mist, bubbles or even acoustic levitation, i.e. floating objects with the help of the same ultrasound speakers as the haptic feedback technology, hoping to bring those mid-air displays to the same performance level as UltraHaptics.

Read more (http://horizon-magazine.eu/article/mimicking-avatars-help-autism_en.html)

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UltraHaptics: Multi-Point Mid-Air Haptic Feedback for Touch Surfaces

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See also:

CORDIS (http://cordis.europa.eu/project/rcn/106707_en.html)

Project:

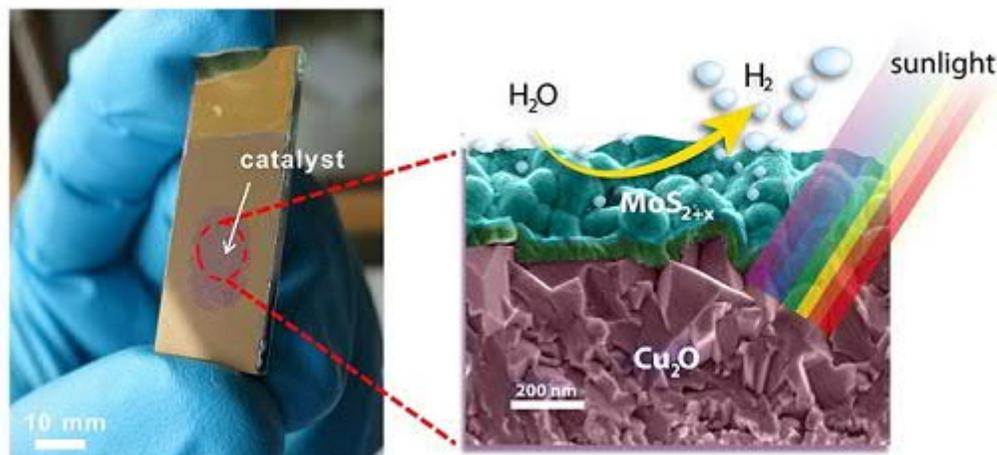
Understanding Mechanisms of Human Social Interaction using Interactive Avatars

Project Acronym:

INTERACT

Wednesday, 15 July, 2015

Without catalysts, humans wouldn't have got far. They trigger many of the processes on which we rely, from age-old mechanisms deep down in our cells to the production of contemporary consumer goods. They could also smooth our path towards a sustainable future. EU-funded researcher Xile Hu has delivered promising advances.



(https://ec.europa.eu/programmes/horizon2020/en/system/files/newsroom/imagescat4ensus_project_image1_9865.jpg)

New catalysts could help to unlock the potential of many innovations, notably by making key processes less costly and reducing the waste they generate. Xile Hu of Switzerland's Ecole polytechnique federale de Lausanne has taken the technology another step ahead.

“ A layered device for sunlight-driven production of hydrogen from water © Xile Hu

An official EU website His research focused on two main challenges: the development of affordable and effective catalysts to produce hydrogen from water using a solar-powered process, and the replacement of the costly catalysts used to synthesise various high-value chemicals by more affordable alternatives that also produce less waste.

Hu benefited from an ERC Starting Grant for CAT4ENSUS (<http://lsci.epfl.ch/page-50362.html>). The European Research Council (ERC) provides this type of funding to support promising scientists with excellent research proposals who intend to set up research teams in an EU member state or an associated country. The proposal submitted by Hu, a Chinese scientist conducting research in Switzerland, ticked all the boxes.

Activating sustainable reactions

"Catalysts are used for many reactions that would otherwise be very slow, or would not happen at all," says Hu. "In the presence of suitable catalysts, these processes unfold very quickly."

And indeed, different processes require different catalysts, many of which are based on expensive and rare metals such as ruthenium, palladium or platinum. Finding more common and affordable substances to set these processes in motion would help to make them less costly and run them sustainably on a much larger scale.

This possibility could contribute to eagerly awaited technological breakthroughs — such as the development of an inexpensive, environmentally friendly process for the production of hydrogen. As a clean and potentially abundant energy carrier, this substance could help to reduce our reliance on fossil fuels, but in fact most of the hydrogen produced at the moment is derived from natural gas.

Hu's team was determined to make its contribution to the advent of the hydrogen economy. Instead of the platinum catalysts that predominate in hydrogen production, it uses molybdenum, combined with sulphur. "*Molybdenum is about a thousand times less expensive than platinum, and a thousand times more abundant,*" says Hu.

This catalyst is intended for a solar-powered process that extracts hydrogen from water. While many other technologies have to come together to transform this approach into an exploitable technology, says Hu, CAT4ENSUS has already achieved very promising results at the lab scale. It is thus paving the way towards affordable and sustainable production, conversion, storage and transport of solar energy.

Creative chemistry

Developing new catalysts requires both information and inspiration, says Hu. "*The relevant chemical reactions have to be analysed rigorously,*" he explains, "*and once they are fully understood, ideas on innovative processes and on ways to produce interesting molecules begin to emerge.*"

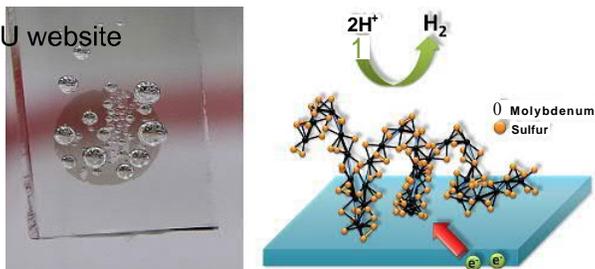
The CAT4ENSUS team used this approach to develop iron-catalysed processes for the synthesis of high-value molecules, notably for the pharmaceutical industry and for use in perfumes. "*Iron is great for this purpose. It is not toxic, and it is one of the most abundant elements on earth and therefore really cheap,*" Hu explains.

The new catalysts are more affordable than the ones used to date, he reports, and the processes they support are designed to generate as little waste as possible. Several of these new catalysts and processes are already used by the private sector.

CAT4ENSUS is due to end in December 2015, and Hu is planning the next steps. The catalyst he and his team designed for the production of green hydrogen will need to be integrated with sufficiently innovative components to support the process, as soon as they become available. This will require extensive research and development, as he notes. And, of course, there are many more processes to create or optimise for the production of exciting, innovative molecules.

Hydrogen evolution using amorphous molybdenum sulfide catalyst

An official EU website



© Xile Hu

See also:

CORDIS (http://cordis.europa.eu/project/rcn/96653_en.html)

Project:

Molecular catalysts made of earth-abundant elements for energy and sustainability

Project Acronym: Cat4Ensus

Wednesday, 15 July, 2015



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/fotolia_81915604_subscription_s_9852_0.jpg)

Disability is often associated with access legislation rather than a source of creativity for architects. With her ERC grant, Prof. Ann Heylighen wanted to reverse this perspective. Her findings suggest that disability can be a valuable source of innovative solutions in architecture by extending prevailing ways of understanding space and designing buildings.

Through their interaction with the environment, disabled people are able to detect obstacles and appreciate spatial qualities in the environment that most architects are not attuned to. The experience and insights of people who are visually impaired or who are diagnosed with autism or dementia can complement and enrich the professional expertise in this field. They can draw attention to features we may all sense but never can formulate as well: for instance the non-visual qualities of a room (temperature, sound, air displacement); or features that (dis)connect or regroup people in a building.

Read more (<http://erc.europa.eu/sites/default/files/content/AAAS-2015-heylighen.pdf>)

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See also:

CORDIS (http://cordis.europa.eu/project/rcn/87384_en.html)

Project:

Architectural design In Dialogue with dis-Ability Theoretical and methodological exploration of a multi-sensorial design approach in architecture

Project Acronym: AIDA

Wednesday, 15 July, 2015

When Prof. Heino Falcke obtained an ERC grant to study and identify the sources of ultra-high energy cosmic rays, back in 2008, he could not imagine that his research would provide an important clue to better understand lightning and thunderclouds much closer to us.



(https://ec.europa.eu/programmes/horizon2020/en/system/files/newsroom/fotolia_63971168_subscription_s_9851.jpg)

His team indeed realized that cosmic rays, originating in outer space and striking the Earth from all directions, can provide a near instantaneous 'picture' of the electric fields in clouds. The unexpected finding, to be published this week in *Physical Review Letters*, is the result of a fruitful collaboration between astronomers, particle physicists and geophysicists. The measurements were performed with the LOFAR radio telescope, located in the Netherlands, and partly funded by the ERC.

Read more (<http://erc.europa.eu/projects-and-results/erc-stories/what-cosmic-rays-tell-us-about-thunderstorms-earth>)

See also:

CORDIS (http://cordis.europa.eu/project/rcn/89101_en.html)

Project:

From Black Holes to Ultra-High Energy Cosmic Rays: Exploring the Extremes of the Universe with Low-Frequency Radio Interferometry

Project Acronym: LOFAR AUGER

Tuesday, 14 July, 2015

An official EU website



(https://ec.europa.eu/programmes/horizon2020/sites/default/files/newsroom/fotolia_86379375_subscription_s_9848_0.jpg)

Researchers for the PHBOTTLE project are developing a manufacturing process for a biodegradable bottle made from juice wastewater. The bottle is made of a bioplastic obtained by the optimised fermentation of the sugar-rich fruit juices in production waste.

The EU-funded researchers plan to demonstrate the process on a packaging production line before the project ends in October 2015. Packagers will not have to buy any major new equipment to make the bottle, a factor the project hopes will encourage them to make the switch, says PHBOTTLE (<http://www.phbottle.eu>s coordinator Ana Valera of Ainia, an agro-food research and development centre in Spain.

During the early stages of the project, the researchers demonstrated how a bioreactor could be used to convert the sugars from juice wastewater into polyhydroxybutyrate (PHB), a type of biopolymer. They also developed a process to strengthen the PHB with cellulose extracted from crop waste, and added an encapsulated antioxidant to increase the shelf-life of the bottle's contents.

Manufacturers would also be able to develop the new PHB for non-food packaging applications such as drugs and cosmetics, or for replacing some of the plastic used for making a vehicle's interior parts, says Valera.

Read more (http://ec.europa.eu/research/infocentre/article_en.cfm?id=/research/headlines/news/article_14_02_17_en.html&item=All&artid=31676&caller=AllHeadlines)

See also:

CORDIS (http://cordis.europa.eu/project/rcn/103432_en.html)

Project:

New sustainable, functionalized and competitive PHB material based in fruit by-products getting advanced solutions for packaging and non-packaging applications"

Project Acronym: PHBOTTLE

Monday, 13 July, 2015

Research by FOODRISChas led to more awareness across Europe of how to more effectively inform people about risks and benefits associated with food, especially through social media

An official EU Website channels, says the project's principal investigator, Patrick Wall of University College Dublin, Ireland.



(https://ec.europa.eu/programmes/horizon2020/en/system/files/newsroom/fotolia_73903197_subscription_s_9839.jpg)

Since the end of the EU-funded project in October 2013, FOODRISC (<http://www.foodrisc.org>)'s researchers have provided advice to food authorities and companies in Europe and China on the best ways to communicate during a crisis situation.

In 2014 and 2015 to date, Wall has been to China several times to present the project's approach to communications to the country's National Centre for Food Safety and Risk Assessment (CFSA), which is the Chinese equivalent of the European Food Safety Authority. Since then, University College Dublin has started a project with the CFSA to adapt aspects of the FOODRISC's research to China.

FOODRISC developed an online resource (<http://resourcecentre.foodrisc.org/>) to help public authorities and companies manage communications on food issues, especially during a crisis. The resource provides guidelines, case studies, tools and tips to help communicators develop effective strategies that inform the public and prevent false information from spreading.

Another online tool developed by the project, Vizzata (<http://www.vizzata.com/>), helps communicators analyse consumer responses to new, conflicting or uncertain messages on food safety, and provides insights to help them with future communications.

"Social media channels, such as Twitter and Facebook, offer food safety authorities new ways to receive and provide information," says Wall. "They can also function as an early warning system. Social media is also very effective in helping to educate target audiences on the benefits of healthy eating."

Read more (http://ec.europa.eu/research/infocentre/article_en.cfm?id=/research/headlines/news/article_13_07_19_en.html&item=All&.artid=30673&.caller=SuccessStories)

See also:

CORDIS (http://cordis.europa.eu/project/rcn/94554_en.html)

Project:

Food Risk Communication. Perceptions and communication of food risks/benefits across Europe: development of effective communication strategies

Project Acronym: FOODRISC

Monday, 13 July, 2015

Weather cladding and external wall panels made of flax, jute, and a resin from sugar cane waste? Yes indeed, if you want a durable, low-carbon solution... EU-funded researchers have

An official EU website developed innovative biocomposites based on such materials and demonstrated their potential in construction.



(https://ec.europa.eu/programmes/horizon2020/en/system/files/newsroom/biobuild_ewp_9833.jpg)

"The aim of the BioBuild (<http://biobuildproject.eu>) project was to reduce the amount of energy needed to produce construction elements — the so-called embodied energy," says Anthony Stevenson of NetComposites in the UK, the project coordinator. The partners' research focused on composite materials mainly derived from biological materials.

“ BioBuild stand at EcoBuild exhibition showing the External Wall Panel (EWP) front centre. Made from flax fibre in a polyester resin matrix. © NetComposites

Biocomposites are fibre-reinforced polymers, i.e. plastics strengthened with woven or non-woven textile materials, where at least one of the components is made from agricultural products.

Biobuild selected biocomposites that show promise as building materials and improved key characteristics such fire retardance, moisture resistance, and the bonding between the fibres and the plastic. The partners then used these substances to produce and test various types of building component.

These applications included external wall panels and cladding, and an internal partition system. In the case of the cladding, the embodied energy is nearly halved compared to a reference product, whereas the other two offer savings of 10 to 15%, says Stevenson. A fourth test application — lamellae for suspended ceilings — also offered a number of advantages, he notes, although the embodied energy was not actually reduced.

Pick your materials

"Back in the 1970s, the amount of energy a building would need for heating and lighting throughout its lifetime was about 10 to 20 times that expended in producing the materials and constructing it in the first place," Stevenson explains.

Today, this ratio has changed. Innovation in areas such as heating, insulation and lighting technology is helping to minimise the energy consumption of modern buildings.

However, there is still ample room for improvement in the construction phase. "If you want to reduce greenhouse gas emissions from housing, you also need to look at the energy used and the amount of carbon dioxide emitted in the process of making the materials," Stevenson notes.



BioBuild set itself the task of developing biocomposites into construction elements that require less energy to produce than similar components made of steel, aluminium or concrete. The project's biocomposites are made of flax or jute fibres, combined with plastics derived entirely from sugar cane waste or partly from vegetable oils.

To improve the sustainability and performance of their biocomposites, the BioBuild partners introduced a number of advances. Stevenson reports that the partners have developed treatments and coatings to make the fibres fire retardant and moisture resistant and improve their adhesion to the plastic. The project also identified promising areas for further development work.

Reap the rewards

Among the applications BioBuild developed before the project ended in May 2015, the wall panels have met with particular success. Durable, self-supporting and comparatively light, these moulded elements can be produced to a wide variety of designs, giving architects great freedom to shape elements that meet exacting technical and aesthetic requirements.

The partners' prototype is a faceted facade element including a window that is not entirely vertical — the frame is slightly tilted to provide a degree of self-shading. This feature reduces the burden on air conditioning systems and further boosts the panels' environmental performance. This innovative concept won the project an award from JEC, a leading composites industry organisation.

See also:

CORDIS (http://cordis.europa.eu/project/rcn/101392_en.html)

Project:

High Performance, Economical and Sustainable Biocomposite Building Materials

Project Acronym:

BIOBUILD

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