



# Science-Switzerland, April – May 2017

News on Swiss science, technology, education and innovation



## Table of Contents

1. Policy .....	3
2. Education .....	4
3. Life Science / Health Care.....	5
4. Nano / Micro Technology / Material Science .....	8
5. Information & Communications Technology .....	9
6. Energy / Environment.....	10
7. Engineering / Robotics / Space.....	12
8. Physics / Chemistry / Maths .....	13
9. Architecture / Design .....	14
10. Economy, Social Sciences & Humanities.....	15
11. Startups / Technology Transfer / IPR / Patents.....	16
12. General Interest .....	17
13. Calls for Grants/Awards.....	17
Upcoming Science and Technology Related Events .....	19



## swissnex Network's Annual Report 2016

(swissnex, April 24, 2017)

2016's annual report gives an insight into the activities of the five swissnex locations and their outposts, as well as of the twenty Science and Technology Counselors and Offices based in the Swiss embassies around the world. Their common objective is to support the international outreach of Swiss institutions and actors in the education, research and innovation domain. The swissnex Network is an initiative of the State Secretariat for Education, Research and Innovation and is part of the Swiss Confederation's network abroad managed by the Federal Department of Foreign Affairs. The activities of the swissnex Network are based on a collaborative approach, relying on public and private partnerships and funding.

Link to the annual report: [www.annualreport.swissnex.org](http://www.annualreport.swissnex.org)

<http://swissinnovation.org/news/web/2017/00-170424-82>



## swissnex Lab at the EXPO 2017 Astana

(swissnex, May 31, 2017)

The EXPO 2017 is taking place from June 10 until September 10, 2017 in Kazakhstan's capital Astana. The swissnex Network is present too, and as part of the Swiss Pavilion, the swissnex Lab is dedicated to thematic immersion and networking, in order to facilitate bilateral cooperation and academic exchange between Switzerland and Kazakhstan. Equally, it allows visitors to conduct experiments and slip into the shoes of an energy scientist. The public will be able to interact and engage with exciting innovative scientific techniques and devices developed in Switzerland. Furthermore, the swissnex Lab connects experts from Switzerland and Kazakhstan in the field of energy-related topics, including higher education institutions, university spin-offs, startups and innovative industry partners.

More information can be found on [www.swisspavilion.org/en/869/swissnex-lab](http://www.swisspavilion.org/en/869/swissnex-lab)

<http://swissinnovation.org/news/web/2017/00-170531-2e>



Switzerland.

## SWISS PAVILION EXPO 2017 ASTANA

## Switzerland's R&D Activities Increased on High Level

(admin.ch, May 29, 2017)

In 2015, Switzerland invested more than 22 billion Swiss Francs in Research and Development (R&D), which represents an increase of 10.5 percent compared to the last elevation in 2012. The most important research actors are the companies, which are responsible for 71 percent of all R&D investments, and in second place the higher education institutions, which account for 27 percent. Internationally compared, Switzerland has a high R&D activity and the investments in this field make up 3.4 percent of the GDP. In an OECD ranking, Switzerland is therefore ranked fourth behind Israel, South Korea, and Japan. The 2012 identified trend towards investing in basic research has intensified again, which is represented in a 44 percent increase within the 3-years period. Especially companies drive this development and they doubled their investments in fundamental research within this timespan.

<http://swissinnovation.org/news/web/2017/00-170529-8c>



## Federal Funding for Swiss Innovation Park

(admin.ch, April 05, 2017)

The Federal Council entered into agreements with the Switzerland Innovation Foundation and approved guarantees for an initial CHF 150 million of funding for the Swiss Innovation Park. This means that concrete project proposals for research infrastructures as well as technological platforms and installations can now be considered. The innovation park is a long-term project to promote Switzerland's attractiveness and competitiveness as a location for research and innovation. The





local institutions are cantons, higher education institutions and the private sector. The Switzerland Innovation Foundation acts as the umbrella organization for the five parks in Basel, Villigen close to the Paul Scherrer Institute, Zurich, Lausanne close to EPFL and in Biel/Bienne. The parks aim at turning innovative ideas into marketable products.

<http://swissinnovation.org/news/web/2017/00-170405-81>

## 75 Startups in MassChallenge Switzerland's Accelerator Program 2017

(MassChallenge, May 23, 2017)

In its second year of existence, the Swiss branch of the Boston-founded MassChallenge accelerator will start its class with 75 startups. The four-month program offers them co-working space, expert mentoring and a network of corporate partners. Around two third of the early-stage companies are Swiss and the rest international. The latter are primarily European but also twelve non-European, among them four US and three Indian ones. The participating companies span across various industries but mostly high-tech (43%) and healthcare/life-sciences (24%). The other classes in Boston and Israel start with 128 respectively 52 startups.

<http://swissinnovation.org/news/web/2017/00-170523-56>



## 1. Policy

### Swiss Voters Approve New Law Promoting Sustainable Energies

(Tagesanzeiger, May 22, 2017)

With 58.2 percent of the votes in favor, the Swiss voters approved a new energy act at the ballot. The so-called "Energierstrategie 2050" aims at decreasing the dependency from fossil energies and turning the Swiss energy sector onto a sustainable way. It includes a gradual withdrawal from the nuclear energy program, the expansion of renewable energies such as water, sun, wind, geothermal power as well as biomass, and the promotion of energy efficiency. The act foresees the support of large-scale hydroelectric plants and the ban of constructing new nuclear power plants. Supporters see the new law's potential to create investments and jobs for economy and society, and to improve the environmental balance. Opponents mainly highlight the high subsequent costs and the risks for the security of supply.

<http://swissinnovation.org/news/web/2017/01-170522-d7>





## 2. Education

### Education Technology Incubator at EPFL

(EPFL, April 27, 2017)

EPFL recently inaugurated a new incubator called "Swiss EdTech Collider" which is located in the existing EPFL Innovation Park and aims at promoting the education technology sector in Switzerland. The 300 square meters co-working space hosts around 30 startups and provides them with exchange and allows synergies with EPFL. The university has been a hub for digital education, especially through the promotion of massive open online courses (MOOCs), which attracted around 1.5 million people since 2012. The market for digital education platforms is expected to continue growing and investments to exceed CHF 250 billion in 2020. The Swiss EdTech Collider should further education research in a digital society through findings in machine learning and data science, for example. The incubator is managed by a non-profit association, received funding from EPFL as well as foundations and is staffed with four EPFL professors.

<http://swissinnovation.org/news/web/2017/02-170427-6a>



### Innovation Space on UN's Sustainable Development Goals at UNIGE

(University of Geneva, May 15, 2017)

The University of Geneva opened a 300 square meters facility where students, researchers, humanitarian workers and UN experts will collaboratively work on practical solutions for a sustainable development. The institution is called "Geneva SDG Solution Space" and focuses on the UN's Sustainable Development Goals (SDG), which were set in 2015. The facility offers state-of-the-art infrastructure such as 3D printers as well as laser cutters and profits from its location within the Biotech Campus which allows including the dimension of public health. The Geneva SDG Solution Space is also strongly tied with the University of Geneva's new Master's program "Innovation, Human Development and Sustainability" which is offered in collaboration with the Tsinghua University in Beijing. The innovation space will host the program's students and welcomes innovative partners, such as the Global Humanitarian Lab. It aims at promoting innovation in the field of sustainable development which should serve and enter International Geneva and its humanitarian networks.

<http://swissinnovation.org/news/web/2017/02-170515-3a>



### 2018's Europe's University Presidents Conference at UZH

(University of Zurich, April 04, 2017)

The University of Zurich was chosen to be the hosting institution of 2018's annual conference of the European University's Association. The network includes around 800 universities in 47 European countries. It provides a platform for the universities and national rector's conferences to discuss education, research and innovation related topics and thus to shape higher education policy. It is where joint projects can be initiated and challenges and opportunities in higher education and research are debated. Around 400 university leaders and other guests are expected to attend the conference, which takes place from April 4 to 6, 2018.

<http://swissinnovation.org/news/web/2017/02-170404-79>





### 3. Life Sciences / Health Care

#### Monitoring Premature Babies with Cameras

(CSEM, April 10, 2017)

Premature babies need to be monitored continuously. In the future, a contactless and wireless camera system developed by EPFL and CSEM could replace the often over-sensitive skin sensors, which cause false alarms in nearly 90 percent of the time. With the new camera, the babies' pulse is detected through their skin color, which changes ever so slightly with every heartbeat. The breathing is monitored through movements in the babies' thorax and shoulders. At night, infrared cameras make the same measurements. First tests showed that the cameras produced practically the same results as conventional on-skin sensors. Further tests will be run under real-life conditions on newborns at the University Hospital Zurich, a partner in the project.

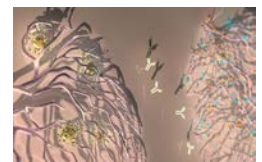


<http://swissinnovation.org/news/web/2017/03-170410-75>

#### Targeting Blood Vessels Improves Cancer Immunotherapy

(EPFL, April 12, 2017)

EPFL scientists have improved cancer immunotherapy against different cancer types by reprogramming tumor blood vessels. Cancer immunotherapy aims at helping the patient's immune system – namely T cells – to recognize and attack cancer. But tumors use several strategies to fight back immune attacks, making immunotherapy work in only a minority of patients. Tumors produce two proteins (VEGFA and ANGPT2) that stimulate the growth of new blood vessels. The study, published in *Science Translational Medicine* and featured on the journal's cover, suggests that blocking these two proteins, using the A2V antibody, is more effective than blocking just one of them. By curbing the growth of tumor blood vessels, A2V starves tumors of oxygen and nutrients. It also inhibits metastasis, a condition that is frequently lethal in cancer patients.



<http://swissinnovation.org/news/web/2017/03-170412-13>

#### Innovative Technique Illuminates Brain Circuits

(University of Geneva, April 01, 2017)

Information flows through the brain via neurotransmitter molecules that diffuse through synapses between two nerve cells. These molecules may spread into tissue, inundating nerve cells, in a process called "neuromodulation". To better understand the impact of neuromodulators on brain circuits and on behavior, it is necessary to identify the stimulated neurons and investigate their activity. As reported in *Nature Methods*, researchers from the University of Geneva and the Max Planck Institute for Neurosciences in Florida have solved this problem using a new technique called iTango, which allows real-time monitoring of neuromodulation. Based on an innovative gene expression system resting on light, this will shed light on how the brain controls the circuits involved in addiction or psychiatric disorders like schizophrenia.

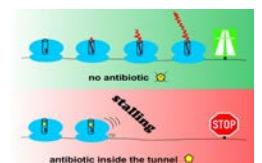


<http://swissinnovation.org/news/web/2017/03-170401-aa>

#### Opening the Path to New Antibiotics

(University of Bern, May 10, 2017)

Two researcher teams from the University of Bern and the ETH Zurich have developed a new method to shed light onto a mostly unknown process of bacterial protein production. Their results could be used for the design of new antibiotics. Ribosomes are the factories of the cell and, as such, are responsible for the fabrication of proteins. Sometimes things get stuck in the fabrication line. Proteins are hindered to leave the exit tunnel and the whole machinery is stalled. Widespread stalling is fatal for the cell, and that is why it is efficiently targeted by antibiotics. By replacing single nucleobase functional groups or even single atoms of





ribosomal RNA, the researchers were able to demonstrate the importance of specific functional groups in the tunnel for drug-dependent ribosome stalling. They identified the exact parts of the ribosomal machinery responsible for sensing and transmitting the stalling signal.

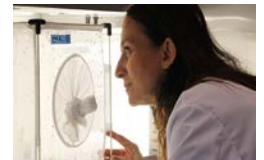
<http://swissinnovation.org/news/web/2017/03-170510-9a>

## Switzerland Participates in EU Project on Zika Research

(University of Zurich, April 07, 2017)

The European Union is pushing research into Zika. UZH insect researcher Eva Veronesi heads a project funded by Horizon 2020 investigating whether an exotic species of mosquito living in Switzerland might also transmit Zika virus. The European Union has funded the ZIKAlliance research consortium with its Horizon 2020 research and innovation program. ZIKAlliance involves 53 partners in the scientific community worldwide, including the University of Zurich. Insect researcher Eva Veronesi, a postdoc at the UZH Institute of Parasitology, is leading a team of three looking into a specific question: Is the Asian bush mosquito (*Aedes japonicus*), which can now also be found in Europe, able to transmit Zika virus?

<http://swissinnovation.org/news/web/2017/03-170407-f8>

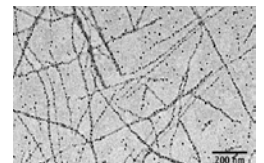


## Combining Protein Fibers and Iron Nanoparticles to Fortify Foods

(ETH Zurich, April 25, 2017)

ETH researchers are developing a new and highly effective way of fortifying iron into food and drinks. Protein nanofibrils are formed from native whey protein. The researchers combined these nanofibrils with iron nanoparticles which can be readily absorbed by the body. The iron-coated whey protein nanofibrils can be administered either in powder or liquid form, and the new compound can be easily added to different types of food without affecting their taste or smell or color. Around 1.2 billion people worldwide suffer from iron deficiency, with women worse affected than men. The ingredients are cheap and in plentiful supply. This iron food supplement would also be a good alternative for people living in poor countries who are more prone to iron deficiency than those living in western industrialized nations.

<http://swissinnovation.org/news/web/2017/03-170425-a2>

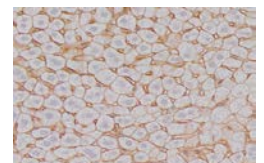


## How the Circadian Clock Affects the Size of the Liver

(University of Geneva, April 28, 2017)

Biologists from the University of Geneva (UNIGE) have discovered how the liver adapts to the cycles of feeding and fasting, and the alternation of day and night within 24 hours. The researchers showed in mice that the size of the liver increases by almost half before returning to its initial dimensions, according to the phases of activity and rest. Published in the journal *Cell*, their study describes the cellular mechanisms of this fluctuation, which disappears when the normal biological rhythm is reversed. The disruption of our circadian clock due to professional constraints or private habits therefore probably has important repercussions on our liver functions.

<http://swissinnovation.org/news/web/2017/03-170428-e5>



## Chaining up Diarrhea Pathogens

(ETH Zurich, April 18, 2017)

Researchers have clarified how vaccinations can combat bacterial intestinal diseases: vaccine-induced antibodies in the intestine chain up pathogens as they grow in the intestine, which prevents disease and surprisingly also hinders the spread of antibiotic resistance. Vaccinations are known to protect against pathogens such as bacteria or viruses. They direct the body to form protective antibodies (IgA), and have been successfully used against some intestinal infections. However, exactly how intestinal antibodies – known as secretory IgA – protect against infections was previously unclear. The researchers showed that vaccine-





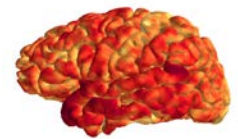
induced IgA effectively “enchained” the pathogens in the intestine: IgA binds the bacteria’s daughter cells to each other during cell division. Although the enchained bacteria can continue to multiply, all their offspring remain trapped in these clumps. This clumping of genetically homogeneous bacteria prevents the attack of the intestinal tissue, accelerates the excretion of the pathogen and prevents genetic exchange between bacteria enchained in different clumps.

<http://swissinnovation.org/news/web/2017/03-170418-dc>

## Immune System, Brain Structure and Memory

(University of Basel, April 26, 2017)

Until recently, it was thought that brain function was largely unaffected by the peripheral immune system. However, in the past few years, evidence has accumulated to indicate that the blood’s immune system could in fact have an impact on the brain. Scientists from the University of Basel have now carried out two independent studies that demonstrate that both the structure of the brain and several memory functions are linked to immune system genes. Although the precise mechanisms behind the links still need to be clarified, the researchers hope that this will ultimately lead to new treatment possibilities.



<http://swissinnovation.org/news/web/2017/03-170426-51>

## Novel Biomimetic Heart Pumps Developed by Swiss Alliance

(Empa, May 04, 2017)

Artificial heart pumps can be tricky: blood clots causing a stroke may develop, and the immune system may attack what it recognizes as foreign. In order to tackle this and other problems with artificial hearts, in 2011 University Medicine Zurich launched the Zurich Heart project in collaboration with the University Hospital Zurich, the University of Zurich and the ETH Zurich. The goal of the project is to develop a fully implantable artificial heart. Around 20 research groups in Switzerland and at the German Heart Institute in Berlin have pooled their outstanding expertise to realize this ambitious goal. As a materials research institute, Empa was a logical partner to contribute to innovative solutions. Two teams from Empa, one from the field of biotechnology/biointerfaces and the other from the textiles sector, are working on this new heart pump, which is “invisible” to the body’s blood clotting and immune system.



<http://swissinnovation.org/news/web/2017/03-170504-14>

## LSD Reduces the Fear Factor

(University of Basel, April 04, 2017)

Scientists at the University of Basel have shown that lysergic acid diethylamide (LSD) reduces activity in the region of the brain related to the handling of negative emotions such as fear. It is well known that hallucinogens have many different effects on the psyche, altering perception, thought, and temporal and emotional experience. After the Basel-based chemist Albert Hofmann discovered LSD in the 1940s, medical research was undertaken into its effectiveness on mental illness. However, LSD was declared illegal worldwide in the 1960s, and research on it came to a standstill. The results of this latest study, published in *Translational Psychiatry*, show that LSD has a ‘de-frightening’ effect that could have positive therapeutic effects and open the way for new treatments of mental illnesses like depression or anxiety.



<http://swissinnovation.org/news/web/2017/03-170404-27>



## 4. Nano / Micro Technology / Material Science

### Replacing Lithium Batteries by Sodium and Magnesium

(SNSF, May 02, 2017)

Lithium-based batteries have several drawbacks, such as the limited availability of the raw material and safety issues associated with the use of a flammable liquid compound. This problem has been exemplified by the recurrence of exploding mobile phones. A recent research at the Swiss Federal Laboratories for Materials Science and Technology (Empa) demonstrates the potential of sodium and magnesium in the development of alternative technologies based exclusively on solid elements. Sodium is a cheap material and has huge reserves, while magnesium stores almost twice as much energy in the same volume compared to lithium. Researchers are still a long way from having a complete and functional prototype, but they have taken the first important step towards their goal.

<http://swissinnovation.org/news/web/2017/04-170502-ac>

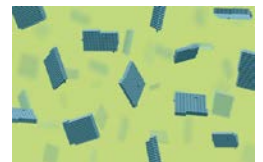


### Nanoplatelets, the Upgraded Quantum Dots

(ETH Zurich, April 04, 2017)

LCD televisions owe their bright color to a physical phenomenon called quantum dots. Those spherical nanocrystals glow when they are excited by light. Close relatives to the quantum dots are the much less understood nanoplatelets. Also just a few nanometers in size, rectangular, and almost two-dimensional, they have an even more strikingly pure color. Researchers from ETH Zurich could now show how those unusually flat platelets form. Other than expected, simple melting of the raw substances cadmium carboxylate and selenium forms a crystallized nucleus that, once exceeding critical size, grows fast on its narrow side. The comparatively slow growth on its flat side is due to poorly bonded atoms on the surface that require a lot more energy to stabilize.

<http://swissinnovation.org/news/web/2017/04-170404-d9>

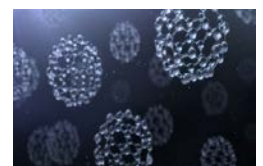


### Predicting Nanoparticle Behavior

(ETH Zurich, April 19, 2017)

As more engineered nanoparticles are produced, they eventually end up in our water and soil. Therefore, it is important to understand their behavior when they do. Scientists at ETH Zurich tried to make sense of the available research data, but determined that nanoparticle behavior varies widely based on environmental conditions and that a comprehensive model could not be established. Factors that affect behavior include acidity of the water or soil, and surface coatings on the nanoparticle as well as the other dissolved compounds that could interact with the nanoparticles. More structured experimentation is needed to devise a complete understanding of nanoparticles in water and soil.

<http://swissinnovation.org/news/web/2017/04-170419-78>







## 5. Information & Communications Technology

### World's Tiniest Intelligent Camera

(CSEM, April 04, 2017)

A novel tiny facial detection-and-recognition camera engineered by CSEM won the gold medal in the vision technologies competition organized by the American magazine Vision System Design. Launched in 2015, the competition rewards the most innovative products from the vision and image-processing industry. With a volume of only six cubic centimeters, CSEM's camera is the smallest intelligent and completely standalone vision system in the world. With its properties it is likely to find applications in the security and automobile industries. In an even smaller format it fits in the Biowatch security bracelet developed for the Swiss company Biowave. This gold medal underscores CSEM's expertise in the development of intelligent, low-energy-consumption miniaturized systems.

<http://swissinnovation.org/news/web/2017/05-170404-79>



### City Model Created from Online Images and Machine Learning

(ETH Zurich, May 17, 2017)

ETH scientists have combined millions of images and videos into a three-dimensional, living model of the city of Zurich. The new technology has many possible applications – for example, it can analyze where and when pedestrians are on the move and parking spaces become free. The platform, known as "VarCity", is so versatile that it can use, evaluate, and automatically combine all possible kinds of image sources: aerial photographs, 360-degree panoramic images taken with special vehicles, and even standard photos such as those published by tourists on social networks and internet platforms. The technology also uses video material from sources like YouTube and public webcams. Thanks to machine learning algorithms, the technology can recognize image content such as buildings, windows and doors, streets, bodies of water, people, and cars.

<http://swissinnovation.org/news/web/2017/05-170517-93>



### Rollback Protection for Secure Digital Transactions

(ETH Zurich, April 28, 2017)

Intel SGX isolates the runtime memory of protected applications (enclaves) from the OS and allows enclaves to encrypt and authenticate (seal) data for persistent storage. Sealing prevents an untrusted OS from reading or arbitrarily modifying stored data. However, rollback attacks, where the adversary replays an old seal, remain possible. Data integrity violations through rollback can have severe consequences, especially for enclaves that operate on financial data. The SGX architecture was recently updated to support monotonic counters that may be used for rollback prevention, but these counters have significant performance and security limitations. Researchers from the ETH Zurich have proposed a new approach for rollback protection on SGX. A single platform cannot efficiently prevent rollback, but in many practical scenarios multiple processors can be enrolled to assist each other. They designed and implemented a rollback protection system called ROTE that realizes integrity protection as a distributed system among participating enclaves. With ROTE, the only way to violate data integrity is to reset all participating platforms to their initial state.

<http://swissinnovation.org/news/web/2017/05-170428-9e>

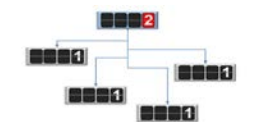


Fig. 1 A counter keeps track of the latest seal. Counter values are shared with participating nodes for the confirmation of the latest state.



## AI Software Summarizes Articles within Seconds

(20 Minuten, April 15, 2017)

The Swiss company Hulbee's newly developed software Getdigest summarizes articles through algorithms and Artificial Intelligence within seconds. It first shows keywords, and then presents the most important sentences which condense the key messages the best. The software is improving itself through a background database and AI algorithms which process the search entries and summaries. The software can either be used for free on the company's website or bought and used as an Add-on in the text processing program Word. The company's intention was to offer a technology which helps people to handle today's information flood.



<http://swissinnovation.org/news/web/2017/05-170415-84>

## 6. Energy / Environment

### Installation Washing Carbondioxide Out of Air

(Tagesanzeiger, May 31, 2017)

The ETH spin-off Climeworks recently opened the first commercial installation worldwide to wash carbondioxide out of the air. The plant is installed on top of an incinerator in Hinwil, canton of Zurich, and is able to filter out 900 tons of carbondioxide a year. It sucks in air via ventilators and in the collectors about 50 percent of the carbondioxide binds to a specific surface. Through the waste heat of the incinerator, the carbon acid gas is separated from the filter and stored under pressure in a liquid state. This liquid carbondioxide can either be stored underground or in the case of Hinwil it is sold to a vegetable producer who uses it as a fertilizer to make his greens grow faster. However, the price being three times higher than the regular one is not competitive yet, it shall be reduced through technical advances. Climeworks' goal of wanting to filter out one percent of the global emissions by 2025 is high, but climate researchers have hopes in the new technology.

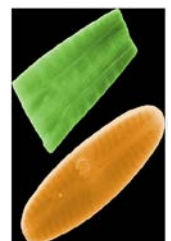


<http://swissinnovation.org/news/web/2017/06-170531-cb>

### Tracking Water Pollution Using Algae DNA

(University of Geneva, April 06, 2017)

Diatoms are a group of unicellular algae particularly sensitive to changes that affect their aquatic environment. This is why they are recommended for use as bio-indicators to monitor water quality in lakes and rivers in Switzerland and throughout Europe. However, identifying them in river samples using a microscope takes a lot of time and skills. Biologists from the University of Geneva have established a water quality index, based solely on the DNA sequences of diatoms in a water sample, without needing to identify each species visually. This study, published in Molecular Ecology Resources, presents a new way of processing a very large number of samples in parallel. It thus enables rapid, cost-effective and reliable bio-assessment measures to protect aquatic environments. It could be adapted for other bio-indicators.



<http://swissinnovation.org/news/web/2017/06-170406-47>



## Aiming at Improved Regional Climate Projections

(ETH Zurich, May 15, 2017)

Most climate scientists agree that heavy rainfall will become even more extreme and frequent in a warmer climate. This is because warm air can hold more moisture than cold air, resulting in heavier rainfall. However, the involved mechanisms are complex and the increase in extreme precipitation varies in space. To better understand regional variations in extreme precipitation, researchers from the ETH Zurich and the Massachusetts Institute of Technology (MIT) decomposed the existing projections into their individual components: the contribution of increasing atmospheric moisture, and the contribution of weaker or stronger vertical wind velocities. According to their models, extreme precipitation will actually become weaker and less common in the monsoon region as well as across the Mediterranean and stronger over Central Europe.

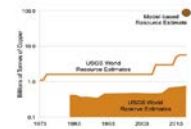


<http://swissinnovation.org/news/web/2017/06-170515-e7>

## Mineral Resource Exhaustion Eventually Is a Myth

(University of Geneva, April 28, 2017)

Opposed to earlier results, an international team with Swiss contribution has demonstrated that mineral resources will not be scarce in the coming centuries. According to the authors, shortages of raw materials like copper and zinc will not become a threat as long as there is a major effort in mineral exploration, coupled with conservation and recycling. The discrepancy is explained by the difference between mineral resources that exist within the Earth, and reserves, which are resources that have been identified and declared to be potentially accessible for economical use. They often lay in the upper 300 meters of Earth's crust. Earlier studies didn't take into account lower quality and undiscovered deposits. Therefore, mineral shortages are not due to a lack of materials, but caused by economic, operational or technical issues.



<http://swissinnovation.org/news/web/2017/06-170428-fb>

## Agricultural Irrigation Affects Climate Extremes

(ETH Zurich, April 12, 2017)

Researchers from ETH and the Vrije Universiteit Brussel quantified the cooling impact on climate by agricultural irrigation. This effect arises as the solar rays make the water on the fields evaporate instead of the air above non-watered ground being heated up. With computational climate simulations, the team showed that through irrigation the daytime temperature is reduced by averaged 0.78 degrees Celsius on the hottest day of the year. In contrast to earlier research, the researchers find the impact of irrigation on climate extremes stronger than on the mean climate. The researchers trace this back to the fact that farmers mainly water when it is hot and dry. Knowing this cooling effect is also very important to take into consideration when measuring climate change effects, as watering could conceal an actual warming trend.



<http://swissinnovation.org/news/web/2017/06-170412-ec>

## Worldwide Unique Machine Regains Metals from Combustion Residues

(20 Minuten, May 17, 2017)

A worldwide unique machine in Hinwil in the canton of Zurich regains metals from the combustion residues which are left over after the waste incineration in the Hagenholz facility. With sieves, magnets and by hand, 4,000 tons of metals were reclaimed from 43,000 tons of clinker in 2016. The biggest share constitute iron and steel, but also aluminum, copper, zinc, lead and even 25 kilos of gold. Instead of being deposited on a landfill, these metals could be recycled. Even though the combustion residues have to be transported to Hinwil for this processing, it is substantially more ecologic than mining new ore, and the amount of landfilled





waste can be reduced. Furthermore, the metals can be sold, which makes the method also financially attractive.

<http://swissinnovation.org/news/web/2017/06-170517-4f>

## Migration of Tropical Rain Belt Caused by Small Temperature Changes

(ETH Zurich, April 24, 2017)

An international research team led by Franziska Lechleitner from ETH Zurich showed that the migration of the tropical rain belt is sensitively influenced even by slight changes in global temperature. They focused on the last two millennia, whereas previous research mostly investigated very long time periods. They assessed tropical rainfall by examining stalagmites, ice cores, sediments in sea, and tree ring records. The team's finding that the tropical belt may migrate because of slight temperature changes only means that manmade climate change could induce this. More strict regulations on air particulates and sulphur may favor the tropical rain belt to move northwards. This would turn the Sahel region less arid and lead to heavier rainfall and stormier weather in Central Europe. As the local population is dependent on agriculture, changes in rain patterns leading to droughts or floodings in the sub- and tropics could be severe to the people.



<http://swissinnovation.org/news/web/2017/06-170424-d5>

## 7. Engineering / Robotics / Space

### Portable Mass Spectrometer

(Eawag, May 09, 2017)

A scientist at Eawag, Swiss Federal Institute of Aquatic Science and Technology, has developed a portable mass spectrometer that weighs only 13 kg and greatly reduces the length of measurement campaigns. Instead of months of laboratory measurements, tests can be carried out on-site in a short amount of time. The unit uses off-the-shelf components and fits in a rolling suitcase. A spin-off company has been created to commercialize the technology due to the great interest in it.



<http://swissinnovation.org/news/web/2017/07-170509-15>

### New Linear Accelerator Will Deliver Higher Luminosity in CERN

(CERN, May 09, 2017)

CERN recently inaugurated its linear accelerator, Linac 4, the newest accelerator acquisition since the Large Hadron Collider (LHC). Linac 4 is due to feed the CERN accelerator complex with particle beams of higher energy, which will allow the LHC to reach higher luminosity by 2021. After an extensive testing period, Linac 4 will be connected to CERN's accelerator complex during the upcoming long technical shut-down in 2019-20. Linac 4 will replace Linac 2, which has been in service since 1978. It will become the first step in CERN's accelerator chain, delivering proton beams to a wide range of experiments.

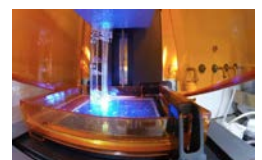


<http://swissinnovation.org/news/web/2017/07-170509-2f>

### 3D Printed Molecular Beam Splitter

(EPFL, April 28, 2017)

The motion of molecule beams can be controlled using electrodes, but this typically requires highly complex electrode geometries with high quality surface finishes. Researchers at EPFL have demonstrated a faster, simpler way to produce these electrodes using 3D printing and electroplating. A special technique allows plastic 3D





printed parts to be selectively electroplated with almost any metal. Complex manufacturing is eliminated and production time for the component is reduced from weeks or months to two days only.

<http://swissinnovation.org/news/web/2017/07-170428-9c>

## Potentially Habitable Planet Discovered in the Whale Constellation

(University of Geneva, April 18, 2017)

An international team of astronomers, including researchers from the University of Geneva (UNIGE) and the National Centre of Competence in Research PlanetS, have discovered a rocky planet (LHS 1140b) in a small star's habitable zone. As reported in Nature, it is a super-earth 1.4 times bigger and seven times more massive than the Earth, orbiting the red dwarf LHS 1140 in the Whale constellation (Cetus) every 25 days. The planet was discovered using Cambridge's MstarEarth instrument, and its mass and density were calculated using the High Accuracy Radial Velocity Planet Searcher (HARPS) – built by the UNIGE's Observatory and based at the European Southern Observatory in Chile. The planet's mass is particularly interesting, since it can potentially maintain an atmosphere and support life.



<http://swissinnovation.org/news/web/2017/07-170418-59>

## Simple Assembly of Radar Reflectors

(ETH Zurich, April 28, 2017)

Scientists at ETH Zurich use radar reflectors to make measurements of Earth features, such as the movement of glaciers. These reflectors are large and often need to be carried to remote locations. An engineer at ETH Zurich invented a simple mechanism to make assembly straightforward and without additional hardware. A set of interlocking tabs on each panel allows them to stably hold each other in the required shape. The same concept could potentially be used for other assemblies, such as furniture and roof structures.



<http://swissinnovation.org/news/web/2017/07-170428-7c>

## 8. Physics / Chemistry / Maths

### Single Laser Dual-Comb Spectroscopy

(ETH Zurich, May 12, 2017)

Researchers at ETH Zurich have developed a simpler dual-comb spectroscopy technique that still requires only a single laser. In traditional spectroscopy, a laser is transmitted through a substance and absorption is compared to a reference signal. The frequency of the laser is slowly scanned to measure absorption across the frequency range. Dual-comb spectroscopy improves on this by measuring all frequencies at once using a special optical element called a frequency comb. The reference signal is created using the same laser and a special crystal that offsets the frequency. This allows the various frequencies to be differentiated by measuring the beat frequency of the primary and reference signals instead of the primary signal directly.



<http://swissinnovation.org/news/web/2017/08-170512-c8>



## New Record in Cryptography

(EPFL, May 04, 2017)

Mathematicians and computer scientists from EPFL and the University of Leipzig, Germany, succeeded in breaking a cryptographic code of exceptional length. Cryptographic methods are used to protect passwords, credit cards or emails. The importance of finding flaws in the mechanisms and improving the ladder is therefore eminent. Many cryptographic methods are based on the fact that the complexity of certain mathematical problems increases greatly when the processed numbers grow. To break the record code, the scientists had to solve a so-called discrete logarithm problem, which is often used in secure internet communications like VPN. By using advanced mathematical methods and after over 1.5 years of calculations on more than 3,500 cores – equivalent to more than 300 computers – the team showed that even very complex codes are not unbreakable.

<http://swissinnovation.org/news/web/2017/08-170504-Of>

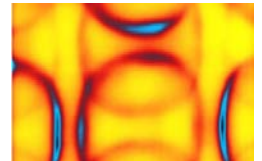


## Electrons Losing Weight

(EPFL, May 01, 2017)

New research from EPFL shows that electrons – against the theoretical prediction – can lose weight in a solid. This contradicts previous knowledge that electrons always gain weight in a solid. The results were obtained by measuring electrons in a lithium containing copper oxide using angle-resolved photoemission spectroscopy. This finding questions current models of electron structure.

<http://swissinnovation.org/news/web/2017/08-170501-32>



## 9. Architecture / Design

### Historical Construction Principles Combined with 3D Printing

(ETH Zurich, April 10, 2017)

Researchers at ETH Zurich's Department of Architecture have developed a concrete floor system that does not require steel reinforcement and is 70 percent lighter than conventional concrete floors. Their design was inspired by the vaulted ceilings of Gothic cathedrals. Using specially developed computer software, they calculated how the ribs would need to be arranged to produce the optimum distribution of compression forces under loading, resulting in an intricate pattern of thin lines that converge at each of the corners. Stress tests have shown that it can withstand an asymmetric load of 4.2 tonnes, which is more than two and a half times more than what the applicable building codes in Switzerland stipulate. To bring the production costs down, they produced the first elements using 3D printing.

<http://swissinnovation.org/news/web/2017/09-170410-ce>



### ETH/MIT Collaboration Wins Intersectional Prize

(STARTS Prize, May 10, 2017)

Gramazio Kohler Research from ETH Zurich and MIT's Self-Assembly Lab won the Grand Prize of the Ars Electronica STARTS Prize 2017. Their work "Rock Print" received the prize in the section innovative collaboration, which honors pieces of work at the intersection between industry or technology and the arts. They presented a sculpture made out of jammed granular matter which was realized by a robotic arm enclosing the gravel with strings based on a computational design. Rock Print should also highlight granular jamming's potential in architecture. swissnex Boston presented the group at the Chicago Architecture





Biennale in 2015, and Sophie Lamparter, Associate Director at swissnex San Francisco, was part of the jury who selected them for the Grand Prize.

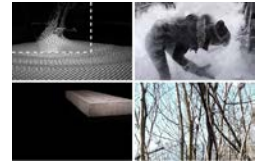
<http://swissinnovation.org/news/web/2017/09-170510-ce>

## Swiss Research in Pictures

The Swiss National Science Foundation organized an image competition whose goal it was to give Swiss research a face. The winning images and videos were chosen based on their aesthetic quality and ability to inspire, amaze, convey or illustrate knowledge, tell a human story, or to discover a new universe. Out of almost five hundred entries, the jury chose four winning images and awarded eleven distinctions in 2017's edition. The winners include a picture on a hydraulic experiment, one with a scientist transferring liquid nitrogen, an out-of-context picture of a wooden block for test tubes, and a video on experiments on trees' capacity to protect against natural hazards carried out on a spreading species in Swiss forests originating in China.

<http://swissinnovation.org/news/web/2017/09-170501-ff>

(SNSF, May 01, 2017)



## 10. Economy, Social Sciences & Humanities

### Assessing the Impact of Climate Risks on the Financial System

Researchers at the Department of Finance of the University of Zurich have developed a novel network-based climate stress-test methodology to assess climate risks of investments portfolios, conditional to policy scenarios. The analysis was based on micro-level data on equity holdings of all EU and US listed companies held by individual financial investors, on balance-sheet data for the top-50 listed European banks, and on financial exposures at the sectoral level. The results suggest that the disclosure of climate-relevant financial information is necessary to improve risk estimations and create the right incentives for investors. However, because combined exposures are large, better disclosure may not be sufficient to mitigate the risk. What matters is the timing and credibility of the implementation of climate policies. An early and stable policy framework would allow for a smoother adjustment of asset prices and for the emergence of net winners and losers in the transition to a low-carbon economy.

<http://swissinnovation.org/news/web/2017/10-170411-af>

(University of Zurich, April 11, 2017)



### Digital Enterprises Are More Innovative

A study from the University of St. Gallen shows that enterprises with a high degree of digital maturity tackle the digital transformation in a spirit favoring experimentation or with a clear-cut strategy, whereas companies with a low degree of digital maturity think of their IT first of all. This is the result of the 2017 Digital Maturity Check. As in the preceding year, digitally mature companies rate their success as more positive in the objectives of customer and employee satisfaction, in particular. Target attainment in the criteria of innovation leadership and the development of new fields of business are valued distinctly higher than in companies with a low degree of digital maturity.

<http://swissinnovation.org/news/web/2017/10-170405-c8>

(University of St. Gallen, April 05, 2017)





## Misperception of People with Mental Illnesses

(University of Basel, April 03, 2017)

Scientists at the University of Basel together with the Psychiatric Clinics of the city have investigated the factors that influence social stigma concerning how dangerous the public considers mentally ill people to be. While a small number of mental illnesses can lead to an increased risk of violence, most patients are not violent. Professor Christian Huber, co-author of the study, said that the goal was to understand whether stigma arise from noticing symptoms or from knowing about psychiatric treatment. In the risk perception survey, which included answers from 10,000 people, description of symptoms led to a stronger attribution of danger. Symptoms of alcohol dependency in particular were perceived as threatening. Treatment in general hospitals, however, was associated with less danger. In order to facilitate destigmatization, the authors therefore suggest enabling lowthreshold contact with psychiatry.



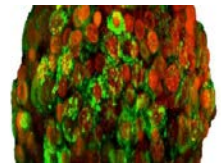
<http://swissinnovation.org/news/web/2017/10-170403-29>

## 11. Startups / Technology Transfer / IPR / Patents

### 3D Micro Livers to Help Predict Drug-Induced Liver Injury

(startupticker.ch, April 27, 2017)

InSphero has entered into an agreement with Pfizer Inc., to use InSphero 3D InSight Human Liver Microtissues to develop novel assays to predict and evaluate certain mechanisms that cause drug-induced liver injury (DILI). The longevity and organotypic nature of these Human Liver Microtissues highly correlates to that of native liver, exhibiting appropriate cellular organization, cytochrome P450 enzyme responsiveness, and metabolic functionality. Using this 3D model could result in improved accuracy and precision by which certain DILI mechanisms are predicted in vitro. These models may also help reducing the dependency on animal models, which add significant cost, delay time to market, and often fail to accurately reflect how humans will respond to a drug.



<http://swissinnovation.org/news/web/2017/11-170427-79>

### Drug Candidate in the Treatment of Sudden Sensorineural Hearing Loss

(startupticker.ch, May 02, 2017)

Sudden sensorineural hearing loss (SSHL) is an abrupt loss of hearing caused by damage to the sound-sensing hair cells of the inner ear. It can be considered a medical emergency. Strekin AG, a clinical-stage biopharmaceutical company based in Basel, has announced that the European Medicines Agency has granted orphan drug designation for the use of STR001 in the treatment of SSHL. Strekin's lead drug candidate STR001 is a potent peroxisome proliferator-activated receptor-gamma agonist currently in Phase 2 clinical development. It effectively protects auditory hair cells of the inner ear through several mechanisms. Results of the ongoing Phase 2 clinical trial are anticipated in the 4<sup>th</sup> quarter of 2017.



<http://swissinnovation.org/news/web/2017/11-170502-b0>

### Calypso Biotech Enters Strategic Partnership with EA Pharma

(startupticker.ch, April 03, 2017)

Calypso Biotech, a Geneva-based spin-off from Merck, announces that it has entered a global licensing and collaboration agreement with EA Pharma. Established as a spin-off from Merck and funded by Merck Ventures, Calypso Biotech is a biotechnology company focused on the research and development of novel biologics in the gastrointestinal disease area. The startup announced that it has licensed CALY-001







best-in-class anti-MMP-9 antibody to EA Pharma. CALY-001 is a promising novel treatment for indications such as inflammatory bowel disease (IBD), potentially capable of preventing disease complications. It prevents in vivo antibody elimination through binding to the abundant pro-enzyme form of MMP-9, while preserving full enzymatic inhibition of activated and disease-relevant MMP-9.

<http://swissinnovation.org/news/web/2017/11-170403-d3>

## 12. General Interest

### Swiss CHF 50 Bill Is "Bank Note of the Year" 2016

(swissinfo.ch, April 25, 2017)

The International Bank Note Society named the Swiss CHF 50 bill the "Bank Note of the Year" 2016. The award honors "artistic merit and or innovative security features". The winning note contains 15 such features: microtext, ultraviolet elements, window cut-outs, glittery thread and shimmery ink for example. It is made out of three layers whereby the outer ones are out of cotton paper and the middle layer consists of a durable polymer. The Swiss CHF 50 note is the first of the newest Swiss note series to circulate, the CHF 20 note followed mid-May.



<http://swissinnovation.org/news/web/2017/12-170425-53>

### Swiss Leads the Best Restaurant in the World in NYC

(Tagesanzeiger, April 05, 2017)

The restaurant Eleven Madison Park in NYC was awarded the best restaurant of the world 2017 by the British magazine "Restaurant". Its co-owner and head chef Daniel Humm is Swiss. The list is compiled by more than a thousand experts such as restaurant critics, chefs and gastronomers. The jury highlighted the restaurant's "perfect twinning of exceptional hospitality and exquisite dishes". Daniel Humm learnt cooking at the nationally well-known Pont de Brent in Vaud, Switzerland, and received several prizes before. The Eleven Madison Park achieved rank number three in 2016's ranking already and was awarded three Michelin stars.



<http://swissinnovation.org/news/web/2017/12-170405-d4>

## 13. Calls for Grants/Awards

### Call: Swiss Fulldome Film Projects

(swissnex Boston, May 01, 2017)

In association with Geneva International Film Festival Tous Ecrans, Geneva studio mySquare and creative space Le D.I.X, swissnex Boston has launched a call for Swiss Fulldome Film Projects for digital creators and audiovisual professionals working in Switzerland to apply for this year's festivals. A unique opportunity to get acquainted with VR and Fulldome technologies and to see your immersive film projected in a 360° dome at the next HUBweek\* in Boston, USA (12-15 October 2017) and Geneva International Film Festival Tous Ecrans, Switzerland (3-11 November 2017). This collaborative venture is designed to foster exchanges and meetings in relation to Swiss digital creation. The selected projects will premiere at the prestigious HUBweek in Boston, and they will then be screened in Geneva during the 23rd Festival Tous Ecrans.



Application deadline: June 23, 2017

<http://swissinnovation.org/news/web/2017/13-170501-fb>



## **Call: Accelerator Program for Healthcare Startups in Basel**

(BaseLaunch, May 01, 2017)

Based in Switzerland's life sciences hub, the Basel region, the accelerator BaseLaunch aims at attracting healthcare startups. It provides them with infrastructure, access to industry, insights and network opportunities, expert advice, as well as the possibility to get venture grants. The accelerator program lasts for 15 months and is backed by the three industry heavyweights Johnson & Johnson, Novartis and Pfizer and other public and private partners. The next program starts in September 2017.

Application deadline: June 30, 2017

<http://swissinnovation.org/news/web/2017/13-170501-be>





## Upcoming Science and Technology Related Events

### Swiss Biotech @ BIO Convention 2017

June 19-22, 2017

<http://ow.ly/PxL030aNyww>

Biotech

San Diego, USA

### Information Security in Healthcare Conference

June 22, 2017

<http://ow.ly/1aJe30ctb5l>

Cybersecurity, Healthcare, Privacy

Rotkreuz

### Swiss Diagnostics Start-Up Day

June 29, 2017

<http://ow.ly/ggpM30aNAbf>

Diagnostics Industry, Startups

Oltén

### 2<sup>nd</sup> Biointerfaces International Conference

August 14-16, 2018

<http://www.biointerfaces.ch>

Biological Surfaces and Interfaces

Zurich

### 13<sup>th</sup> Symposium of the Zurich Center for Integrative Human Physiology

September 1, 2017

<http://ow.ly/crKY30ctbT2>

Human Physiology

Zurich

### The Economics of Innovation: from Basic research to the Market

September 4-6, 2017

<https://theeconomicsofinnovation.org>

Innovation Theory and Process

Geneva

### Top 100 Swiss Startup Award 2017

September 6, 2017

<http://ow.ly/LzgZ308SFHm>

Innovation, Entrepreneurship, Startup

Zurich-Schlieren

### Design Biennale Zürich

September 7-10, 2017

<http://www.designbiennalezurich.ch/>

Design, Discipline

Zurich

### Swiss startups @ Medtech and Healthcare Startup Tour India

October 3-8, 2017

<http://ow.ly/Pclh30aNzGz>

Medtech, Healthcare

Bangalore/Mumbai

### Life Sciences Symposium

October 24-26, 2017

<https://lss2017.epfl.ch/>

Metabolism, Cell Biology, Physiology, Genetics

Lausanne

### 22<sup>nd</sup> International Transport and Air Pollution Conference (TAP2017)

November 15-16, 2017

<http://tapconference.org/>

Air Pollution, Mobility, Emission, Policies

Zurich



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