



## Science-Switzerland, April – May 2012

News on Swiss science, technology, education and innovation

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### First State Secretary for Education, Research and Innovation

(admin.ch, May 23, 2012)

Dr. Mauro Dell'Ambrogio has been appointed the first Director of the State Secretariat for Education, Research and Innovation (SERI) to be newly established on January 1, 2013 under the Department of Economics. Dr. Dell'Ambrogio currently heads the State Secretariat for Education and Research SER which will be merged with the Federal Office for Professional Education and Technology OPET to create SERI. The new organization will be headed by State Secretary Dell'Ambrogio drive Switzerland's policy of putting top priority on education, research and innovation as described in the Legislative Plan for 2011-2015. The Federal ERI policy 2013-2016 formulated under this plan has highlighted consolidating the high level of grant funding awarded on a competitive basis and further strengthening Switzerland's internationally competitive position in research and innovation as one of its three guidelines.



<http://swissinnovation.org/news/web/2012/01-120523-0b.html>

<http://swissinnovation.org/news/web/2012/01-120523-z9.html> (ERI-policy 2013-2016)

### Switzerland Among Top In World Competitiveness Rankings

(IMD, May 31, 2012)

IMD business school released its worldwide competitiveness ranking, which measures how well countries manage economic and human resources to increase their prosperity. The top three rankings went to Hong Kong, the United States, and Switzerland. The US has a strong effect on the rest of the world and is very competitive with its innovation. Europe is still struggling with the recession, but Switzerland nevertheless achieved a high ranking. The majoring of the ranking criteria were determined through a survey of executives around the world. The survey also found that views of globalization and economic reform varied around the globe.

<http://swissinnovation.org/news/web/2012/00-120531-7a.html>

## 1. Policy

### SNF Provides CHF 713 million for Basic Research

(SNF, May 24, 2012)

In 2011, the Swiss National Science Foundation (SNSF) invested CHF 713 million in basic science, 1.8% less than in the record year 2010 (CHF 726 million). The 2011 Annual Report shows that the SNSF approved more than 3,400 research proposals to the amount of CHF 713 million last year. The budget was distributed as follows: 26% Humanities and Social Sciences; 35% Mathematics, Natural and Engineering Sciences; 39% Biology and Medicine. The SNSF supported over 8,400 researchers, of whom 4,400 were doctoral students. In the coming years, the SNSF aims to expand its support for use-inspired basic research. In 2011, it therefore integrated practice-oriented research at universities of applied sciences and universities of teacher education into its general project funding.

<http://swissinnovation.org/news/web/2012/01-120524-ca.html>



## Switzerland and South Africa Step Up Cooperation on Science

(startupticker.ch, May 01, 2012)

A high-level Swiss delegation led by the State Secretariat for Education and Research arrived in South Africa last week and met their counterparts from the South African Department of Science and Technology to discuss the main points of the second phase of cooperation under the bilateral agreement signed in 2007. At the meeting the two parties gave a highly positive assessment of the first phase of the programme, in which Switzerland has invested around CHF 7.8 million. This investment, made on a match-funding basis, has been used for 16 joint research projects in the fields of public health and biomedicine, bio- and nanotechnology, and humanities and social sciences. For the 2013-2016 phase, the two parties agreed to maintain the same financial commitment as for the previous period and to include renewable energy as a priority research field.

<http://swissinnovation.org/news/web/2012/01-120501-05.html>

## 2. Education

### New Strategic Foundation at the University of Zurich

(UZH, April 12, 2012)

The University of Zurich (UZH) has established the "UZH Foundation" to raise additional funding in order to realize and accelerate strategically important projects. As a cantonal university, UZH gets its funding primarily from public sources. To allow selected research fields to compete on a global scale, it is necessary to provide them with further means. The new foundation will allow the university to access and use funding from private sources more efficiently by being more visible to private sponsors and being an independent institution. The university raised 32 million Swiss francs in 2011 from private sources. The goal of the new UZH Foundation is to rise this figure up to 60 million Swiss francs per year over the next three years.



<http://swissinnovation.org/news/web/2012/02-120412-cc.html>

### Rising Student Numbers at ETH Zurich and EPFL

(ETH Board, April 27, 2012)

The number of students at ETH Zurich and EPFL rose by 6.3% in 2011 to a total of 25,629. New entrants rose by 6.9%, particularly in mathematics, informatics, natural sciences and technics (the "MINT" subjects). The proportion of women pursuing Bachelor courses of study rose slightly once again to 29.4%. The professor-to-student ratio, which is closely observed in international rankings, deteriorated further in 2011 (from 1:33.2 in 2002 up to 1:35.8 today), despite the fact that the ETH Domain employed 30 more professors in 2011 than it did the previous year (new total: 749). Industry associations Swissmem and scienceindustries welcome the growth in student numbers and are calling for the ETH Domain to maintain its leading international position, and for greater investment on the part of the Swiss Confederation.

<http://swissinnovation.org/news/web/2012/02-120427-1c.html>

## 3. Life Science

### Cancer Pain Self-Management

(UNIBAS, April 01, 2012)

Despite effective treatment options, pain control is inadequate in over 40% of cancer patients. As oncology treatment usually takes place in the outpatient setting, patients and their family caregivers need to implement cancer pain management themselves. The dissertation study "Testing an Intervention Designed to Support Pain Self-Management in Cancer Patients: A Mixed Methods Pilot Study" at the Institute of Nursing Science, University of Basel, has used the Self-PRO(c) Pain Control Program, an intervention developed in the United States to support pain self-management of oncology patients and their family caregivers. The pilot study showed that the program was feasible to use in a German speaking population. However, experiences with study procedures showed that for example recruitment procedures needed to be adapted. Even though pain related knowledge increased significantly, pain reduction was moderate.

<http://swissinnovation.org/news/web/2012/03-120401-5c.html>



## Robotic Endoscopic Surgery

Endoscopic surgeons perform minimally invasive surgery using cameras, mirrors, and long tools. However, this can often be imprecise because the tools are rigid, and operating by looking at a mirror requires extensive training. A new EPFL spinoff, DistalMotion, released a prototype of a device that allows surgeons to control tools using joysticks. This leads to more precise movements and better surgical results. The price point of the device is also lower than other robotic surgery tools. DistalMotion has been funded with a Venture Kick prize, and pre-clinical trials should take place later this year.

<http://swissinnovation.org/news/web/2012/03-120402-b4.html>

(EPFL, April 02, 2012)



## Epigenetic Marking Mechanism

Epigenetic markers on DNA control which genes are expressed in a certain cell; not all cells express all genes. When a cell divides, its DNA is copied, but the epigenetic markers need to be recreated separately. Researchers at the University of Zurich recently discovered the mechanism responsible for copying these markers. They discovered that a kind of RNA previously thought to be waste was a key part of the process. This new result could be a step towards treating cancer because cancerous cells can form when genes are not expressed correctly.

<http://swissinnovation.org/news/web/2012/03-120402-9f.html>

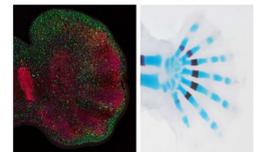
(UZH, April 02, 2012)

## Finger Growth Regulation

Growth of organs and extremities is achieved by balancing cell proliferation and differentiation. If the correct balance is not achieved, then embryos can grow additional fingers, for example. Researchers at the University of Basel have uncovered the importance of the transcription factor GLI3. GLI3 slows down proliferation, allowing cells to differentiate at the appropriate time and in the appropriate place. They were able to show that removing GLI3 in mouse embryos consistently led to the growth of up to eight fingers per paw. Defects in GLI3 can also lead to malignant tumors in both children and adults.

<http://swissinnovation.org/news/web/2012/03-120403-6f.html>

(UNIBAS, April 03, 2012)



## Sleeping Sickness Treatment

African sleeping sickness is a common disease caused by a parasite. However, current treatment methods are primitive and have many side-effects. Researchers at the University of Bern have discovered a better way to treat this disease. They discovered a specific substance, cardiolipin, required by the mitochondria of the parasite. By inhibiting the production of this substance, the parasite can no longer metabolize, and so it dies off. A similar approach may be applicable to other tropical diseases such as malaria and leishmaniasis.

<http://swissinnovation.org/news/web/2012/03-120410-b7.html>

(UNIBE, April 10, 2012)

## Predictive Neuroscience

Researchers at the EPFL have discovered rules that relate the genes that a neuron switches on and off to the shape of that neuron, its electrical properties and its location in the brain. The discovery, using state-of-the-art informatics tools, increases the likelihood that it will be possible to predict much of the fundamental structure and function of the brain without having to measure every aspect of it. By combining a classification scheme based on the neuron's morphology, its electrophysiological properties and its position within the brain with a limited set of genetic data relating to ion channels, the scientists were able to predict the ion channel pattern of the neurons with high accuracy. The results have been published in the open-access journal PLoS ONE.

<http://swissinnovation.org/news/web/2012/03-120413-2f.html>

(EPFL, April 13, 2012)



## Reactivation of Neural Stem Cells

Most adult mammals, including humans, cannot regenerate brain cells. Originally it was thought that adults had no more stem cells in the brain, but this is not the case. Instead, neural stem cells are simply inactive. Rodents, however, are able to activate their stem cells and regenerate neurons. Researchers at the University of Basel have shown that the Notch1 receptor plays a key role in activating neural stem cells in mice. Even after being kept inactive for one year, cells could still be reactivated. Why humans don't have this mechanism is still to be determined.

<http://swissinnovation.org/news/web/2012/03-120419-4f.html>

(UNIBAS, April 19, 2012)



## Dung Fly Sexual Size Dimorphism

In many insects females are larger than males. However, in European dung flies, males are significantly larger than females. Researchers at the University of Zurich have noticed several significant differences between European dung flies and their North American counterparts. The European ones strongly favor larger males, and they copulate much more frequently and randomly. However, the reasons for this evolutionary difference can only be reconstructed indirectly.

<http://swissinnovation.org/news/web/2012/03-120413-dc.html>

(UZH, April 13, 2012)



## Patch Against Hay Fever

Researchers at the University Hospital of Zurich have developed a medical patch that reduces symptoms of hay fever by 70 percent. The patch contains typical pollen allergens and through six day-long applications before peak allergy season trains the immune system to not overreact to the harmless pollen. This method is safer than injection-based therapy because the risk of introducing allergens to the bloodstream is lessened, which can cause a severe systemic reaction. Nevertheless, the method needs some improvement because it currently requires removing the epidermis to work effectively.

<http://swissinnovation.org/news/web/2012/03-120419-46.html>

(SNF, April 19, 2012)

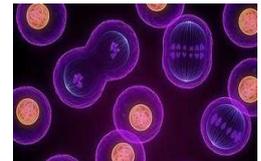


## Protein Regulating Fat Cell Production and Cell Division

EPFL scientists have uncovered the role of SMRT, a protein involved in regulating the production of fat cells, known as adipogenesis. In the process of investigating this, they discovered another critical role played by SMRT in a variety of cell division and differentiation processes. SMRT is a so-called "co-repressor" protein; it doesn't act alone, but by binding with another protein that in turn has the ability to bind with a strand of DNA. As long as SMRT stays bound to its host, the stem cell won't transform into a fat cell. EPFL professor Bart Deplancke and his team were able to pry apart the details of this process and reconstruct the origins of adipogenesis.

<http://swissinnovation.org/news/web/2012/03-120423-05.html>

(EPFL, April 23, 2012)



## Link Between Peroxisomes and Killer T Cells

Scientists of the University of Basel have found a direct link between peroxisomes and the immune system. The immune system not only protects the body from external pathogens like viruses, bacteria, fungi, and other parasites but also plays an important role in the defense against tumors. The focus of current research in the field of autoimmunology is on natural killer T cells. The group of Prof. Gennaro De Libero located antigens in the thymus that are responsible for the maturation of T killer cells. These lipid molecules contain ether bonds that are produced by a peroxisomal enzyme. So far peroxisomes have never been considered in the development of killer T cells. These results were published in the journal "Nature Immunology".

<http://swissinnovation.org/news/web/2012/03-120423-81.html>

(UNIBAS, April 23, 2012)

## Genetically Modified Apple Trees

Researchers at ETH Zurich are growing cis-genetically modified Gala apple trees that are resistant to apple scab. Instead of introducing genes from unrelated species, they spliced in a gene from a wild apple species to increase resistance to the fungal disease. The real benefit of this modification is that less fungicide has to be used when growing the trees. However, because of regulatory burdens, there is no good economic case for growing these trees in Europe. Instead the researchers are looking to northern India and Pakistan as potential markets.

<http://swissinnovation.org/news/web/2012/03-120423-31.html>

(ETH Zurich, April 23, 2012)



## Statistical Nature of Learning Process

Behavioral variability has long been attributed to the background noise that our neurons are known to experience. But a team from the University of Geneva has a new hypothesis. According to them, that variability is rather due to our relative ignorance of the world that surrounds us. Alexandre Pouget, Professor at the Fundamental Neuros-

(UNIGE, April 23, 2012)



science Department, explains that if noise was the cause of behavioral inconsistencies, both our hands should be equally skilled. Therefore the discrepancy is due to the neuronal algorithms' quality and not their background noise. The mastery of a precise gesture is made possible by the fact that hundreds of thousands of neurons, rather than one, give, in average, a response that varies less and less. Our learning process is deeply statistical in its nature.  
<http://swissinnovation.org/news/web/2012/03-120423-4c.html>

### Caffeine Reduces Blood Pressure

(SNF, April 24, 2012)

Individuals consuming large amounts of drinks containing caffeine exhibit a lower blood pressure. This new correlation, only holding for non-smokers, has been shown by a study supported by the SNF. High blood pressure over prolonged times increases the risk of heart attacks and strokes. Non-smokers can reduce this risk by drinking coffee; one cup per day can reduce the blood pressure up to 9 millimeters of mercury. Even though coffee causes a short term rise of the blood pressure, in the long term the effect is opposite. Not unlike jogging, where the blood pressure rises during the actual running but the regular exercise reduces the risk of heart attacks. The study has been performed by Murielle Bochud of the University Hospital Lausanne and has been published in the journal "Human Molecular Genetics".

<http://swissinnovation.org/news/web/2012/03-120424-30.html>

### New Center for Neuroprosthetics

(EPFL, April 25, 2012)

In 2009 EPFL established the Center for Neuroprosthetics, a cross-disciplinary research center that intertwines neuroscience, medicine, and engineering. The center is focused on five main areas of research: 1. human-computer confluence, 2. hearing research, 3. technology-assisted rehabilitation after stroke, 4. walking again & paraplegia, and 5. bionic arm & amputation. This research is helping people regain functionality lost due to accidents or medical problems. The center's goal is to transition the latest technologies from research into clinical settings.

<http://swissinnovation.org/news/web/2012/03-120425-35.html>



### Monitoring the Mobility of Bed-Ridden Patients

(Empa, April 26, 2012)

In June a monitoring system is becoming commercially available that will allow nursing staff to accurately record the mobility of bedridden persons. The system has been developed for the prevention of bedsores by Compliant Concept, a start-up at Empa's glaTec technology center. The monitoring system is part of an intelligent hospital bed system for decubitus prophylaxis. Healthy people move an average of two to four times per hour in their sleep. The movements are triggered by pain that occurs when tissue has an insufficient blood supply. However, the decubitus prophylaxis that is "built in" by nature does not work in people with paralysis and patients who are sedated, unconscious or suffering from a high fever; often it also fails in elderly people.

<http://swissinnovation.org/news/web/2012/03-120426-0f.html>



### On-The-Spot Allergy Diagnosis

(abionic.com, April 27, 2012)

The EPFL spin-off Abionic is developing a portable biomedical system designed to detect allergies such as pollen, food and allergies to various domestic animals. The abioSCOPE is an autonomous device and can provide an allergy diagnostic readout within 15 minutes based on a single drop of blood. It is the low quantity of blood, the speed and quality of the readout that has the potential to revolutionize allergy diagnostics. Abionic recently finalized the closing of a USD 2.2 million first financing round led by MedHoldings SA and announced having been granted the Red Herring Top 100 Europe Award, honoring the most promising private technology ventures from European business region.

<http://swissinnovation.org/news/web/2012/03-120427-7a.html>



### Yeast for Protein Production

(ZHAW, May 02, 2012)

The Zurich University of Applied Sciences has been developing the use of the yeast *Pichia pastoris* for production of proteins needed in medicines. Until now, these proteins were extracted from animal or plant matter, or grown from other cells. This technology promises to reduce the rising cost of medicines. This year, the university co-hosted a conference on the use of this bacteria. The conference was a successful international gathering of re-



searchers, and included a laboratory course on the best combination of process strategies and molecular tricks for various production needs.

<http://swissinnovation.org/news/web/2012/03-120502-64.html>

### Escape Response of Small Fish Reproduced on Supercomputer

(ETH Zurich, May 02, 2012)

Small fish bend themselves into a 'C' shape before they flee from predators. Observations have suggested that this shape helps them to abruptly put the greatest distance possible between themselves and their predators. ETH researchers have now tested this hypothesis for the first time using a supercomputer. With the help of algorithms based on the fundamentals of evolution biology, the researchers have used the capabilities of the CSCS supercomputer «Monte Rosa» to reproduce the escape response of zebrafish larvae. Using massive parallel calculations they reproduced the behaviour that the fish developed during their biological evolution over millions of years. The findings from the study have now been published in the Journal of Fluid Mechanics and selected as a focus article.



<http://swissinnovation.org/news/web/2012/03-120502-1b.html>

### Biological Roots of Domestic Violence

(EPFL, May 02, 2012)

In an experiment carried out with rats at EPFL, it was observed that aggressive behavior passed from one generation to the other, even without any contact between the parent and its offspring. Researchers from the Brain Mind Institute were able to show that purely biological elements played a crucial role in the development of aggressive behavior. The experiment begins with male rodents who were exposed several times during their youth to two types of psychological stress. As adults they showed a more aggressive behavior towards them than their peers. The male offspring of these stressed rats showed an aggressive behavior towards females, just like their fathers had done, even though the rat couples had been separated before the birth of their offspring. This study has been published online in Translational Psychiatry.



<http://swissinnovation.org/news/web/2012/03-120502-ca.html>

### Inflammation Mechanism

(UZH, May 02, 2012)

Sickness and injury produce warning signals for our bodies, which lead to molecular changes. Specifically, changes in protein production are triggered by corresponding changes in gene transcription. Researchers at the University of Zurich discovered a new mechanism by which the transcription protein ARTD1 reconfigures itself and changes protein production. They discovered that the protein Caspase 7 cuts ARTD1, allowing it to rearrange itself on the gene being transcribed. The function of Caspase 7 was previously known about in relation to cell death, but not to inflammation reactions. This research may lead to better anti-inflammatory treatments.

<http://swissinnovation.org/news/web/2012/03-120502-78.html>

### Brain-Radar to Remove Tumors

(Berne University Hospital, May 02, 2012)

Neurosurgeons from the Berne University Hospital have developed a procedure to remove brain-tumors formerly thought to be impossible to remove surgically. Removing tumors close the motor control center has so far been thought too risky, as accidental removal of brain tissue may leave the patient with disabled limbs. By employing a probe to stimulate the area around the tumor with a tiny electric current, the neurosurgeons succeeded to measure the distance to the motor control center with high precision. Using this "brain-radar", they were able to remove the tumors completely in 93% of the patients of the study, sometimes as close as 2mm to motor control neurons. The results of this study have been published in the journal Neurosurgery.

<http://swissinnovation.org/news/web/2012/03-120502-19.html>

### Subconscious Processing

(UNIBE, May 04, 2012)

New research from the University of Bern shows that subconscious memories can affect our conscious decisions. Furthermore, subconscious processing can happen in the hippocampus, just like conscious processing that ties together disparate memories. The researchers made this discovery through a study where they flashed two pictures in front of subjects to introduce subconscious processing, and then showed a third picture that required a conscious decision based on the first two pictures. Using MRI they were able to show that the hippocampus was used for subconscious processing of the first two images.

<http://swissinnovation.org/news/web/2012/03-120504-a7.html>

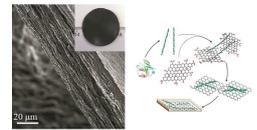


## Enzyme-Sensing Paper

(ETH Zurich, May 07, 2012)

Researchers at ETH Zurich have invented a new type of nanocomposite paper made of layers of graphene and protein fibrils. The paper, made of alternating layers of the two substances, is made using vacuum filtration. Graphene is electrically conductive and hydrophobic, while protein fibrils are hydrophilic and can be digested by enzymes. These properties allow the material to have shape memory effects and to be used to measure enzyme activity. In the latter case, protein breakdown by enzymes changes the electrical conductivity of the material, which can be measured in a circuit. Different proteins can be used to target different enzymes.

<http://swissinnovation.org/news/web/2012/03-120507-95.html>



## Modern Human Brain Developed Earlier than Thought

(UZH, May 08, 2012)

A large neonate brain, rapid brain growth and large frontal lobes are the typical hallmarks of human brain development. These appeared much earlier in the hominin family tree than was originally thought, as anthropologists from the University of Zurich who re-examined the Taung child's fossil cranial sutures and compared them with other fossil skulls now prove. The Taung child, who died at about four years of age, has a suture between the two halves of the frontal bone. According to the research team's analyses, this so-called metopic suture is already ossified in most chimpanzees of the Taung child's age, but often is not in human children of the same age. The late fusion of the cranial sutures in the Taung child is also found in many other members of the *Australopithecus africanus* species and the earliest examples of the *Homo* genus.

<http://swissinnovation.org/news/web/2012/03-120508-3c.html>

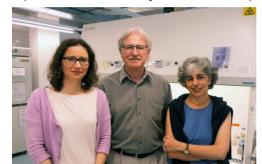


## Innovative Parasite Treatment

(UNIBAS, May 10, 2012)

Swiss researchers received a grant from the Bill and Melinda Gates Foundation to study an innovative treatment against trypanosomes, parasites that cause African sleeping sickness. When in the human bloodstream, this parasite protects itself with a shell of glycoproteins. It sheds the protection only when entering the Tsetse fly. The proposed treatment method tricks the parasite into shedding its protection while still in the human bloodstream, thus allowing the immune system to respond appropriately. Around 100,000 substances will be tested as triggers to make the parasite shed its protection.

<http://swissinnovation.org/news/web/2012/03-120510-0b.html>



## Cause of a Lethal Noma Sickness Discovered

(UNIGE, May 11, 2012)

The Noma is a rare but terribly handicapping or even lethal sickness for children. Although known for a long time, its cause was unknown. Recently, large progress has been made by a team which the University of Geneva and its Hospitals are part of. Indeed, the likely causal sequence at the origin of the sickness has been brought to light, enabling new possible prevention means to be discovered. The results deny the implication of any virus in the early phases of the sickness and do not report the presence of a bacteria that had been suspected by earlier research. The starting point of the disease would actually be a particularly strong gingivitis. Further investigations will be undertaken.

<http://swissinnovation.org/news/web/2012/03-120511-a1.html>

## Light Affects Cognitive Mechanisms

(EPFL, May 14, 2012)

Tests conducted in EPFL's Solar Energy and Building Physics Laboratory (LESO) have confirmed the hypothesis that light influences our subjective feeling of sleepiness. The research team also showed that the effects of light exposure last until the early evening, and that light intensity has an impact on cognitive mechanisms. The results of this research were recently published in the journal *Behavioral Neuroscience*. Light synchronizes our biological clocks. It is collected in the eye by photoreceptors that use photopigments known as melanopsin. These cells, which differ from rods and cones, are considered a third class of photoreceptors in the retina and were discovered just ten years ago. They're not there to form an image, but to perceive and absorb photons in the visible light spectrum.

<http://swissinnovation.org/news/web/2012/03-120514-85.html>



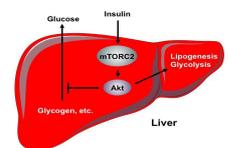


## Diabetes and Cell Growth Regulation

Recent research shows that the protein mTOR, and specifically the protein complex mTORC2, regulates cell growth and can be responsible for tumor growth. A new study shows that this protein can also be responsible for diabetes. If it is inactivated, then the regulation mechanism for the metabolism of saccharides no longer functions properly, leading to high blood sugar and insulin levels. This was shown on mice, which developed type II diabetes when the relevant gene was shut off. One current cancer treatment is to use mTOR inhibitors, but this new research shows that a potential side effect is the development of diabetes.

<http://swissinnovation.org/news/web/2012/03-120514-d6.html>

(UNIBAS, May 14, 2012)

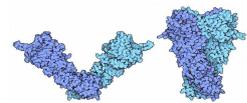


## Environmental Effect on Genes

Our bodies respond to external environmental factors, and new research shows that cell nuclei do as well. One way they do this is through heat shock proteins, which support other proteins under elevated temperatures, as well as control gene transcription machinery. Furthermore, heat shock proteins can affect cell memory by putting epigenetic markers on genes. These markers can be passed down to daughter cells or even to offspring. This new result is interesting for certain cancer drugs that inhibit one type of heat shock protein, and may lead to more specific targeting of this protein.

<http://swissinnovation.org/news/web/2012/03-120514-69.html>

(ETH Zurich, May 14, 2012)



## Link Between Good Memory and Post-Traumatic Stress Disorder

Researchers at the University of Basel have found a genetic link between good memory and susceptibility to post-traumatic stress disorder, or PTSD. They found that people with a certain variant of the gene PKC alpha are better at remembering learned information. The regions of the brain responsible for memory are more active in these people than in others. However, the study additionally found that people with this variant of PKC alpha are also more susceptible to PTSD, which can occur after particularly stressful accidents or instances of violence. The researchers specifically studied survivors of the Rwandan genocide and their memories of that incident.

<http://swissinnovation.org/news/web/2012/03-120515-ef.html>

(UNIBAS, May 15, 2012)

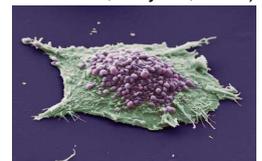


## Detecting Tumour Cells Individually

ETH Zurich researchers have devised a method to detect mutations in tumour cells that are only present in a proportion of the cancer's cells. The analysis reveals that cells of individual tumours are more variable than first thought – and differ from patient to patient. This makes it difficult to treat a tumour with medication as there might be cells that do not respond to the drug used. Researchers from ETH Zurich and the Swiss Institute of Bioinformatics teamed up with colleagues from the University of Zurich to develop a new method for determining the genetic variants of tumour cells reliably. Using this method, the researchers are able to detect mutations that only appear in one in every 10,000 cells. The study has just been published in Nature Communications.

<http://swissinnovation.org/news/web/2012/03-120516-83.html>

(ETH Zurich, May 16, 2012)



## Functional MRI Interpretation

Functional magnetic resonance imaging (fMRI) is a safe and accurate tool to indirectly measure brain activity through the blood oxygen level in various parts of the brain. However, fMRI cannot tell what type of cells are causing the activity. Researchers at the University of Zurich combined fMRI with calcium indicators that react to the activity of specific types of cells. By combining the two methods, they can correlate cell type and fMRI signature. This information will allow for better interpretation of fMRI output. So far, this experiment has been performed on rats, where the calcium indicators could be observed through an optical fiber.

<http://swissinnovation.org/news/web/2012/03-120523-b2.html>

(UZH, May 23, 2012)



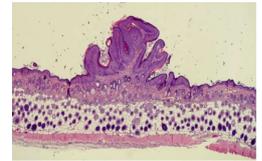


## Protein Identifies Cancer Cells at an Early Stage

Cells use a wide range of proteins to communicate among each other. Researchers from the University of Berne have now identified a protein on the cell surfaces that can be used to identify cancer cells at an early stage or even prevent their growth to begin with. The surface protein in question, called "Flower", usually displays the current fitness of the cell to its neighbors. If a cell is underperforming compared to its peers, it is forced to self-destruct. Usually, this mechanism ensures an optimal composition of the tissue but cancer cells can abuse this system by signaling their superiority to even well performing neighbors, leading to their destruction. This surface protein could be used to tag cancer cells for an early diagnosis or even as a target point for medications.

<http://swissinnovation.org/news/web/2012/03-120525-c7.html>

(UNIBE, May 25, 2012)

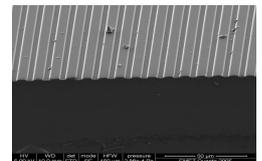


## Bandage for Wound Healing

For wound healing to occur, cells known as fibroblasts must migrate to the wound area. Researchers at ETH Zurich have developed a new bandage that can aid this process and still be removed at any time during healing. The bandage has small grooves that guide the movement of the fibroblasts. Tests show that wounds heal faster when the grooves are oriented in the direction the fibroblasts need to move, such that they have the least resistance. Because the cells do not adhere to the bandage, it can be removed at any time. More tests are needed to develop a product, but industry interest is growing already.

<http://swissinnovation.org/news/web/2012/03-120529-ee.html>

(ETH Zurich, May 29, 2012)



## Recovery After Spinal Cord Injury

Scientists wake up a dormant spinal column and restore voluntary lower body movement when stimulated. Rats with spinal cord injuries and severe paralysis are now walking (and running) thanks to researchers at EPFL. Published in the journal Science, the results show that a severed section of the spinal cord can make a comeback when its own innate intelligence and regenerative capacity is awakened. The study, begun five years ago at the University of Zurich, points to a profound change in our understanding of the central nervous system. According to lead author Grégoire Courtine, it is yet unclear if similar rehabilitation techniques could work for humans, but the observed nerve growth hints at new methods for treating paralysis.

<http://swissinnovation.org/news/web/2012/03-120531-c8.html>

(EPFL, May 31, 2012)

## 4. Nano / Micro Technology / Material Science

### Imaging Technique for Quick Check-Ups of Bridges

A new imaging technique developed by scientists at EPFL, ETH Zurich and Empa, who combined their expertise in fields such as materials science, measurement methods and signal processing, permits a quick and easy diagnosis of corrosion in the steel rebar skeleton of bridges. Currently, the most widely used diagnostic method is to drill core samples from the bridge deck. A maximum of ten samples can be taken from a 100-meter bridge. Using microwave radiation that is able to penetrate the structure of the bridge, construction defects, water pockets, and the presence of chloride ions can be detected. Such georadars have been in use for the last decade but the produced data is difficult to interpret. The new numerical treatment of the data yields images that allow for a quick and easy diagnosis.

<http://swissinnovation.org/news/web/2012/04-120418-15.html>

(EPFL, April 18, 2012)



### New Swiss Nano Portal

By continuing the action plan for synthetic nanomaterials, the Federal Council aims to promote and develop the safe handling of synthetic nanomaterials as well as Switzerland as a nano-location. The primary focus is on developing a methodical basis for nano-specific provisions, thereby creating the prerequisites for appropriate regulation while continuing the dialogue with industry, economic stakeholders, the scientific and research communities as well as consumer organisations. To promote the dialogue between the stakeholders and to give consumers comprehensive and current information on opportunities, risks and dangers of nanomaterials' effects on health and the en-

(BAFU, April 25, 2012)



vironment the portal InfoNano.ch was launched. InfoNano is the central federal information platform for nanotechnology and presents information on a broad range of topics ranging from applications of nanotechnology and protection measures to the legislative process and enforcement in this field.

<http://swissinnovation.org/news/web/2012/04-120425-f8.html>

### Protective Clothing with Built-In Cooling

Empa has, together with its industrial partners, developed a «smart» protective vest with an integrated cooling system based on the Coolpad technology, originally designed for use in cooling garments for medical applications. The Coolpads built into the vest are filled with water, which is allowed to evaporate through the membrane, cooling down its surroundings. A mini fan blows air through a fabric spacer behind the pad, providing further cooling. Comparative measurements show that the new vest is significantly lighter and also cools much better than systems currently on the market. In practical use, the vest has proven its worth. Staff of the Zürich City police force tested the vest over several warm summer days and gave a positive assessment.

<http://swissinnovation.org/news/web/2012/04-120514-64.html>

(Empa, May 14, 2012)

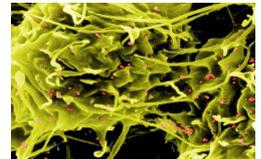


### Nanoparticle Handbook

Researchers at Empa have developed a handbook for manufacturing, testing, and analyzing nanoparticles that they hope will provide a unified standard. Currently, many standards exist, and nanoparticles are described in varying ways, making comparison difficult. This handbook stemmed from the Nanommune project, which is looking at the health effects of nanoparticles. The concern is that these particles are too small to be recognized by the immune system, and the health effects are unknown, though no detrimental ones have been discovered yet.

<http://swissinnovation.org/news/web/2012/04-120521-c6.html>

(Empa, May 21, 2012)



### Synthetic Nano-Waste Withstands Incineration Plant

Tiny particles of cerium oxide do not burn or change in the heat of a waste incineration plant. They remain intact on combustion residues or in the incineration system, as a new study by researchers from ETH Zurich reveals. Due to the increasing use of nanoparticles in construction materials, paints, textiles and cosmetics, for instance, nanoparticles also find their way into incineration plants. Three ETH-Zurich teams from fields of chemistry and environmental engineering sprayed ten kilograms of cerium oxide particles measuring eighty nanometers in diameter onto refuse to be incinerated. The researchers' tests revealed that cerium oxide does not change significantly during incineration. The fly-ash separation of the incineration plant proved extremely efficient: the scientists did not find any leaked cerium oxide nanoparticles in the waste incineration plant's clean gas.

<http://swissinnovation.org/news/web/2012/04-120521-8b.html>

(ETH Zurich, May 21, 2012)



## 5. Information & Communications Technology

### Serial Link Technology for Faster and More Energy Efficient Communication

(startupticker.ch, April 01, 2012)

The EPFL spin-off Kandou has developed a new approach to serial link design that increases the bit rate for a given physical communications link. With this technology more bits can be sent per unit of energy, or less energy can be used to achieve a given bit rate. For common high speed links, speed increases on the order of 400% or bus power reductions to 25% are readily achievable and will yield meaningful net design and manufacturing cost reduction as well. These gains are complementary, thus additive, to known advanced serial link design techniques in use today. Kandou was founded by Amin Shokrollahi and Harm Cronie in 2011 and recently raised USD 10 million in a series A financing round.

<http://swissinnovation.org/news/web/2012/05-120401-3d.html>

### Cloud-based Automatic Speech Recognition Service

(startupticker.ch, April 23, 2012)

The Koemei Web Service platform enables transcription of video and audio content for captioning, indexing, search and discovery and SEO. At the core of Koemei Web Service is its speech decoding engine which converts the au-



dio of every speaker into text. Nearly \$16 billion is spent annually on traditional transcription with approximately 120,000 transcriptionists in United States and is expected to grow 21 percent annually in the corporate and education markets. Koemei Web Services will be used in enterprises and by transcription service providers to increase accuracy and efficiency. What separates the Idiap Research Institute spin-off Koemei from other services is its unique cloud-based multi-speaker speech recognition platform and API for transcription of video and audio content at large scale.

<http://swissinnovation.org/news/web/2012/05-120423-a8.html>

### 3D Sensors Eliminate Blind Spots of Trucks

(startupticker.ch, April 30, 2012)

A truck changing lanes always risks collision, due to the limited field of view offered by windows and rear-view mirrors. According to U.S. Dept. of Transportation, more than 413,000 accidents are caused by blind spot related problems annually. Those accidents damage more than 826,000 vehicles and injure or kill more than 160,000 people every year. The ETH Zurich spin-off Vissee has developed BlindSpot3D for trucks, a revolutionary sensor inspired and reverse engineered from nature that combines a regular live image of the rear and sides of a truck with a real-time, high-resolution distance measurement. The distance to all objects is shown as a color overlay on the image, and a visual and sound alarm warns about impending collisions.

<http://swissinnovation.org/news/web/2012/05-120430-67.html>

### Tool Automates Photo Cropping

(EPFL, May 18, 2012)

Croppola is a user-friendly online tool that helps photo-lovers to make the most of their pictures. Croppola's motto is: "You shoot, we compose." Its algorithms analyze the content of images and provide an automatic suggestion for a crop that could be a professional's choice. The online program computes various features; and faces – if any – are detected. Using this information, a search is done through all possible crops and the one that is most in harmony and balance in terms of contrast and colors is suggested. This new tool is the brainchild of Radhakrishna Achanta and Appu Shaji, both PhDs in the field of Computer Vision. They collaborate with the Image and Visual Representation Group (IVRG), directed by Professor Sabine Süsstrunk at the School of Computer and Communication Sciences, EPFL.



<http://swissinnovation.org/news/web/2012/05-120518-a9.html>

### Traffic Management Systems To Avoid Jams

(EPFL, May 21, 2012)

Traffic lights on highway access ramps can help prevent traffic jams. EPFL engineers are testing this approach to increase the capacity of Swiss highways which are operating close to their limits in many parts of the country. From 2009 to 2010, an only 2.6% increase in highway traffic raised the number of reported traffic jams by a third. With funding from the Swiss Federal Roads Office, engineers at the Laboratory of Urban Transport Systems (LUTS) are developing intelligent traffic management systems to optimize traffic flow on highways in real-time. Using data obtained from traffic monitoring devices mounted along the highway and on access roads, the system would act as a virtual traffic warden, smoothing traffic by regulating the speed limit and restricting traffic flow onto the highway in real-time.



<http://swissinnovation.org/news/web/2012/05-120521-d4.html>

### Reducing Data Center Energy Production

(EPFL, May 25, 2012)

Researchers at EPFL have developed a device intended for monitoring and saving the energy consumed by large data centers. It was developed in collaboration with Credit Suisse, which has used it to equip the power of its server racks. Internet currently represents 8% of the energy annually used in Switzerland, a figure that could soon reach the values of 15% to 20% in the coming years. Researchers at the Embedded Systems Laboratory (ESL) at EPFL have developed a tool that provides the means to monitor and track the power consumption of a data center. It can also be used to distribute the workload among several servers, thus allowing significant energy savings. For example, two servers running at 40% of their capacity each, consume much more than only one at 80%.



<http://swissinnovation.org/news/web/2012/05-120525-31.html>



## World's Most Powerful DC Data Center

(ABB, May 30, 2012)

ABB and Green announced the official opening of Green's new Zurich-West data center expansion based on direct current (DC) technology. The facility is the most powerful application of DC in a data center to date. Performance tests showed that Green's new power distribution system is 10% more efficient than for comparable alternating current (AC) technology. In addition, investment costs for the system were 15% lower than for an AC system. With the addition of almost six million new servers every year, data center energy demand is increasing at a rate of more than 10% annually, requiring more efficient and reliable solutions. DC systems are less complex than AC systems, making fewer power conversions. This requires as much as 25% less space, and reduces equipment, installation, and real estate and maintenance costs.

<http://swissinnovation.org/news/web/2012/05-120530-18.html>

## 6. Energy / Environment

### Carbon Dioxide Levels During Ice Ages

(UNIBE, April 01, 2012)

Researchers at the University of Bern have been using ice core samples to better understand historical levels of carbon dioxide. They invented new method that can isolate the CO<sub>2</sub> and identify the relative levels of the several isotopes. With these new data, they determined that during ice ages CO<sub>2</sub> was sequestered deep in the ocean and during warm periods changing ocean currents brought it to the surface. These data will allow existing models to be verified and improved so that they can make better predictions. The researchers also say that despite the changing levels of CO<sub>2</sub>, today's levels are much higher than in the past 800,000 years.

<http://swissinnovation.org/news/web/2012/06-120401-6e.html>

### Future Diesel Exhaust Cleaning System

(Empa, April 03, 2012)

Switzerland's only exhaust laboratory is going to help to comply with diesel exhaust limits. Diesel exhaust contains a mixed bag of nitrogen oxides, collectively called NO<sub>x</sub>. These are unavoidable in combustion processes at high temperatures. Conventional catalytic converters such as the ones used in petrol engines cannot reduce NO<sub>x</sub>, which are responsible for the formation of smog. NO<sub>x</sub> are removed by means of reduction. Small diesel engines in passenger cars use a NO<sub>x</sub> storage catalytic converter, which collects the NO<sub>x</sub> and has to be "emptied" every now and then. To do this, the engine runs "rich" for about 10 seconds every two minutes. More diesel fuel is injected, and the non-combusted carbon in the fuel reduces the NO<sub>x</sub> into harmless nitrogen and water vapour. Advantage: cleaner exhaust. Disadvantage: a higher fuel consumption.

<http://swissinnovation.org/news/web/2012/06-120403-f5.html>

### Plants Mimic Scent of Pollinating Beetles

(UZH, April 03, 2012)

The color and scent of flowers and their perception by pollinator insects are believed to have evolved in the course of mutual adaptation. However, an evolutionary biologist from the University of Zurich has now proved that this is not the case with the arum family at least, which evolved its scent analogously to the pre-existing scents of scarab beetles and thus adapted to the beetles unilaterally. The mutual adaptation between plants and pollinators therefore does not always take place. Previously, researchers always assumed that floral scents and the fondness of pollinating insects for a specific scent evolved mutually via coevolution of plants and insects. However, the evolutionary biologist Florian Schiestl from the University of Zurich now proves that this was not the case with the arum family and their pollinators.

<http://swissinnovation.org/news/web/2012/06-120403-a0.html>

### Barometer of Global Water Resources

(EPFL, April 05, 2012)

Every good produced at a given location, particularly agricultural goods, requires water. When the good is imported into another country, that country is also importing the water that went into its production; this is "virtual water." "This concept is very interesting when one observes it in terms of its flow between countries, particularly in terms of how the flow of virtual water evolves over time," explains Andrea Rinaldo, director of EPFL's Ecohydrology Laboratory (ECHO). The concept of virtual water was invented twenty years ago by John Anthony Allen, a British geographer and professor at King's College London. Rinaldo and his colleagues at Princeton Uni-





iversity publish an article this week in the Proceedings of the National Academy of Science (PNAS) outlining the results of a study they conducted comparing the global trade of virtual water between 1986 and 2007. They found that Asia increased its virtual water imports by 170% during this period.

<http://swissinnovation.org/news/web/2012/06-120405-d3.html>

### Study on the Economic Viability of Wind Power

(ETH Zurich, April 16, 2012)

A team of scientists headed by Tobias Schmidt from the ETH Zurich's Department of Management, Technology and Economics (D-MTEC) investigated which renewable energy sources should be funded in developing and emerging countries. The researchers calculated and compared what it would cost to generate a tenth of the electricity demand with wind power or photovoltaics for six selected countries in the south. The study concludes that one can produce more electricity per invested dollar in all the countries if the money is invested in wind power plants. The study by the ETH-Zurich scientists is the first in which the costs of a partial switch to wind and solar power is calculated in detail for individual countries in the south and compared with today's energy production costs.



<http://swissinnovation.org/news/web/2012/06-120416-1c.html>

### State of Himalayan Glaciers

(UNIZH, April 19, 2012)

Almost 800 million people live in the catchments of the Indus, Ganges, and Brahmaputra rivers and rely to varying degrees on the water released from Himalayan glaciers. After the wrong assessments of the IPCC that the Himalayan glaciers might disappear by 2035, the state of the Himalayan glaciers has been pushed into the spotlight of politicians and scientists. An international team led by Tobias Bloch from the University of Zurich has now published a review of the state of Himalayan glaciers in the journal *Science*. They find that, while most of the glaciers are indeed shrinking, they do so only with a rate comparable to the global average. They also point out the serious implications should the dams of newly emerged glacial lakes breach.



<http://swissinnovation.org/news/web/2012/06-120419-4a.html>

### Electric Cars Less Environmental-Friendly than Cars with Diesel Engine

(NZZ am Sonntag, April 22, 2012)

A study commissioned by the Federal Office for the Environment has revealed that electric cars are not necessarily more environmental-friendly than comparable cars running on gasoline or diesel fuel if one takes their whole life-cycle into account. Indeed, the most economical VW Golf running on diesel fuel has a 32% lower environmental footprint than an electric car of comparable size. Even the most widely sold 1.6 liter model running on gasoline is marginally better from an environmental standpoint. The source of the used electricity has a large impact on the environmental footprint. Taking the Swiss electricity-mix as an example, an electric car produces four times as much radioactive waste during its life-time than its petroleum based counterparts.

<http://swissinnovation.org/news/web/2012/06-120422-f8.html>

### Better Average Fuel Economy

(BFE, April 27, 2012)

New cars in Switzerland in 2011 had an average fuel economy of 6.39 liters per 100 kilometers, a 3.5% improvement over 2010. CO2 emissions dropped 3.7% to 155 grams per kilometer. Mechanical efficiency, as measured by fuel economy per vehicle weight, improved as well, but average car weight increased, somewhat offsetting this gain. Engine size decreased as well, but was compensated for by increased use of turbochargers. The latest laws set a CO2 target of 130 grams per kilometer by 2015, which requires a reduction of approximately 4% per year.

<http://swissinnovation.org/news/web/2012/06-120427-44.html>

### Weather Database Reaching Back to the 16th Century.

(UNIBE, May 03, 2012)

The University of Berne has published the database "Euro-Climhist" about Swiss weather, climate and natural dangers. The database has over 125'000 entries reaching back to the year 1550. To model the occurrence of once-a-century events, insurance companies need access to long historic records. Meteorological data from before the middle of the 19th century is hard to come by, as systematic record-keeping of meteorological data began only with the emergence of instruments to measure the weather. The new database includes historical records from sources such as chronicles, personal notes, and records of public institutions like hospitals and will be of great help to understand and predict future natural disasters.

<http://swissinnovation.org/news/web/2012/06-120503-68.html>



## Swiss Solar Ship Completes Around-the-World Journey

The Swiss solar powered ship "Tûranor" completed its 585 day around-the-world journey, arriving back at its departure port in Morocco. The ship is only powered by its large solar cell array that drives two electric motors using up to 93.5 kW of power. The ship acted as an ambassador for environmental stewardship at all the ports it called on its journey, traveling westbound through the Panama and Suez canals. The ship was funded by the Swiss engineer and adventurer Raphael Domjan and the German solar company Immo Ströher.

<http://swissinnovation.org/news/web/2012/06-120504-b3.html>

(NZZ, May 04, 2012)



## Climate Research Project

(NZZ, May 04, 2012)

A large international team recently launched the Pegasos research project to investigate the chemical and physical processes that take place in the atmosphere up to 2000 meters. These processes have a direct effect on air quality and climate change. The project will fly a suite of instruments on an airship in different places in Europe. ETH Zurich and the Paul Scherrer Institute are on the team. ETH Zurich is responsible for updating atmospheric models based on the flight data. The Paul Scherrer Institute is responsible for an instrument that measures aerosols in the atmosphere and observes their reaction with sunlight.

<http://swissinnovation.org/news/web/2012/06-120504-da.html>



## From Dung to Biogas

(BFE, May 04, 2012)

Swiss agriculture produces over 20 million tons of biological waste, such as dung and manure, which could be used in the production of biogas. The goal of the project "Naturafarm Biogas50", which had been initiated in 2005, was to investigate if such an approach to biogas production would be feasible. The final report shows that the 11 biogas-plants produce roughly 6.4 GWh of electricity and 5.7 GWh of usable heat per year, enough to supply 1800 and 1000 homes with electricity and heating, respectively. The use of heat allowed to save 578'000 liters in fuel per year used for heating, corresponding to 1500 tons of CO<sub>2</sub>. To make the plants economically viable, they are dependent on reimbursements between CHF 0.28 and CHF 0.48 per kWh fed into the grid.

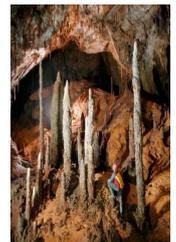
<http://swissinnovation.org/news/web/2012/06-120504-f1.html>

## Tropical Climate Stored in Stalagmites

(ETH Zurich, May 04, 2012)

An international research team headed by ETH Zurich has presented for the first time comprehensive data on the history of precipitation in the central tropics going back to 570,000 years. The scientists investigated stalagmites from caves in Borneo, and the results are the oldest existing climate data from stalagmites. Stalagmites record chemical changes in the drip water over long time periods, and so the scientists were able to show from rock samples how the regional precipitation developed. With their study, Nele Meckler from the Geological Institute at ETH Zurich and her colleagues were able to show that precipitation during different interglacial periods in the central tropics did not change much, in contrast to data from ice cores that suggest a distinct change of the interglacial climate happened about 430'000 years ago. Their findings have been published in the journal Science.

<http://swissinnovation.org/news/web/2012/06-120504-00.html>



## Atmospheric Lead Levels

(PSI, May 22, 2012)

Researchers at the Paul Scherrer Institute were able to reconstruct atmospheric lead levels in Russia from an ice core drilled in the Altai Mountains. The ice in glaciers captures the atmospheric history by trapping small particles. The research showed that lead levels started to rise around 1770 because of coinage manufacturing in the Altai region. Then, a sharp increase occurred when leaded gasoline was introduced. After 1970 levels began to decrease because of economic troubles and the dissolution of the Soviet Union. Europe saw a similar decrease, but this due to a switch to unleaded gasoline.

<http://swissinnovation.org/news/web/2012/06-120522-e7.html>





## Promoting Eco-Friendly Behavior

(ETH Zurich, May 23, 2012)

ETH Zurich is participating in three recently launched Climate-KIC projects that aim to reduce energy usage and CO<sub>2</sub> output in several sectors of society. The ENERVIS project motivates individual people to save energy by making them more aware of their environmental footprint. The Off4Firms project focuses instead on employers and the methods they can use to encourage employees to be more environmentally friendly. Finally, the Smart Urban Adapt project is developing a three-dimensional geographic map to help simulate and visualize the effect on the environmental footprint of proposed changes to an urban area. The tool could be used by city planners, for example.



<http://swissinnovation.org/news/web/2012/06-120523-26.html>

## Graetzel Cells Used In Consumer Product

(EPFL, May 29, 2012)

Dye-sensitized solar cells (DSSC) from EPFL enter the public market. Logitech has selected dye-sensitized solar cells born right here on campus. The technological choice of this world leader demonstrates both the maturity of this invention and that it is market-ready. After several years developing its industrial application, these particularly innovated solar cells can be implanted into products such as portable tablets. This marks a new stage for Michael Graetzel's discoveries at the Laboratory of Photonics and Interfaces. Not only are the dye-sensitized solar cells relatively inexpensive, but also they are of particular interest for their finesse and efficiency: they work equally well in ambient light as in artificial light and can produce sufficient energy even without directly facing a light source.



<http://swissinnovation.org/news/web/2012/06-120529-f6.html>

## 7. Engineering / Robotics / Space

### Ultra-High-Speed Mini Turbocompressors

(Celeroton, April 01, 2012)

Celeroton launches its new product line of ultra-high-speed turbocompressors with speed and size not achieved so far. These turbocompressors allow for superior solutions for various applications in terms of compactness, light weight and high efficiency. Celeroton's miniature turbocompressors replace standard compressors with the same pressure ratios and flow rates by being 50 times lighter, smaller, and highly efficient. Application areas are compressors for heating, ventilation and air conditioning (HVAC) in future all electric or hybrid cars, air supply for decentralized and mobile pressure and vacuum generation, breathing air preparation, air supply in mobile and local fuel cell systems and heat pumps in buildings as well as household appliances.



<http://swissinnovation.org/news/web/2012/07-120401-f6.html>

### Miniature Ionic Motor Allows Nanosatellites to Maneuver Autonomously

(EPFL, April 01, 2012)

Imagine reaching the Moon using just a fraction of a liter of fuel. With their ionic motor, MicroThrust, EPFL scientists and their European partners are making this a reality and ushering in a new era of low-cost space exploration. The complete thruster weighs just a few hundred grams and is specifically designed to propel small (1-100 kg) satellites, which it enables to change orbit around the Earth and even voyage to more distant destinations – functions typically possible only for large, expensive spacecraft. The just-released prototype is to be employed on CleanSpace One, a satellite under development at EPFL that is designed to clean up space debris, and on OLFAR, a swarm of Dutch nanosatellites that will record ultra-low radio-frequency signals on the far side of the Moon.

<http://swissinnovation.org/news/web/2012/07-120401-46.html>

### Autonomous Micro Helicopters

(ETH Zurich, April 23, 2012)

The Autonomous System Laboratory at ETH Zurich has been working to develop micro air vehicles that can navigate and map their terrain using only a camera but no GPS. Of the three onboard cameras, one is used for flight control, which is performed by a small onboard computer, and the other two are used for three-dimensional modeling of the overflown terrain. The images are processed in near real-time by an offboard computer running an algo-





rithm developed by the Institute for Visual Computing, also at ETH Zurich. Many uses are envisioned for the flying robots, including assistance in disaster areas and providing aerial protection.

<http://swissinnovation.org/news/web/2012/07-120423-e6.html>

### Radioactive Iodine Filter

The Paul Scherrer Institute and industrial company CCI AG have signed a licencing agreement for iodine filtration processes. In the nuclear disaster at Fukushima in Japan last year, the radioactive compounds that escaped from the plant caused both human and environmental damage. Modern filtration systems can considerably reduce the leakage of radioactive materials after serious nuclear accidents. Researchers at the Paul Scherrer Institute (PSI) in Villigen have developed an efficient technique for filtering radioactive iodine. The technique removes virtually all of the radioactive iodine from contaminated exhaust air before it is released into the environment from a damaged power plant. PSI has now found a contractor who can supply the technique for use in nuclear power plants around the world.

<http://swissinnovation.org/news/web/2012/11-120427-32.html>

(PSI, April 27, 2012)



### Precision Robot for Spinal Column Operations

Placing a screw 4 mm in diameter into a bone that measures, on average, 6 mm in width, with cerebral arteries on one side and the spinal cord on the other is a risky operation for even the best surgeons. Neuroglide, the robot developed by researchers from the group "Virtual Reality and Active Interfaces" (VRAI) at the Robotic Systems Laboratory (LSRO2) at EPFL, has demonstrated a precision of 0.5 mm for this operation. Right now, trials are being done on bodies donated to science at the CHUV, and a start-up, KB medical, is being created to get the robot on the market. The device shows promise in other applications as well, such as in procedures to remove tumors that present a different resistance to cartilage and other neighboring tissues.

<http://swissinnovation.org/news/web/2012/07-120504-5b.html>

(EPFL, May 04, 2012)



### Tracking Space Junk with Lasers

Researchers at the observatory of the Astronomical Institute of the University of Berne (AIUB) were able to measure for the first time a laser pulse reflected of a satellite that had originated from another ground station. The laser pulse was sent from the Space Research Institute (Institut für Weltraumforschung, IWF) in Graz, Austria. Usually, the two institutes observe and measure distances to satellites individually by measuring the transit time of a short laser pulse that gets reflected by retroreflectors mounted on the satellites. This time however, the laser pulse was reflected diffusely of the surface of the satellite and by using precisely synchronized clocks, the position of the satellite could be calculated to within a few millimeters. This technology could in the future be used to track low-orbit space debris.

<http://swissinnovation.org/news/web/2012/07-120508-1c.html>

(UNIBE, May 08, 2012)



### New Champion Telescope With Swiss Funding

Switzerland is contributing around CHF65 million towards the European Extremely Large Telescope (E-ELT), the largest optical/near-infrared telescope in the world. The government gave the green light to paying 5% of the cost of CHF 1.3 billion project, ensuring Swiss scientists will have access to the telescope. The E-ELT will be built on Cerro Armazones, a Chilean mountain at an altitude of 3,060 meters. With its 40-meter in diameter main mirror, the telescope aims for a number of notable firsts, including tracking down Earth-like planets. It will also perform "stellar archaeology" in nearby galaxies, as well as make fundamental contributions to cosmology by measuring the properties of the first stars and galaxies and probing the nature of dark matter and dark energy.

<http://swissinnovation.org/news/web/2012/07-120509-e2.html>

(EDI, May 09, 2012)

### Several Antennas in One

Scientists at EPFL have developed a single antenna that is capable of transmitting the same data as a two-antenna system. This achievement will be more than useful for future communication systems. Currently MIMO (multiple-input, multiple outputs) uses several antennas to transmit and receive signals. This technique is progressively being implemented in devices

(EPFL, May 11, 2012)





such as wireless modems and is to be used for the next generation of mobile phones. However, it poses problems because it is costly and difficult to integrate into hardware. At EPFL, Julien Perruisseau-Carrier's group has demonstrated that a single antenna can simultaneously transmit two separate signals that have the same throughput as a MIMO solution.

<http://swissinnovation.org/news/web/2012/07-120511-77.html>

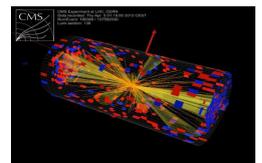
## 8. Physics / Chemistry / Math

### New Record Collision Energy at LHC

The LHC attained stable 4 TeV proton beams today, resulting in a new record collision energy of 8 TeV. Although the increase of 1 TeV in collision energy is relatively modest, it translates to an increased discovery potential that can be several times higher for certain hypothetical particles. "The increase in energy is all about maximizing the discovery potential of the LHC," said CERN Research Director Sergio Bertolucci. "And in that respect, 2012 looks set to be a vintage year for particle physics." The LHC is now scheduled to run until the end of 2012, when it will go into its first long shutdown in preparation for running at an energy of 6.5 TeV per beam as of late 2014.

<http://swissinnovation.org/news/web/2012/08-120405-f6.html>

(CERN, April 05, 2012)



### First Observation of Electron Splitting

An electron has for the first time been observed to decay into two separate quasi-particles, a spinon and an orbiton. Each of those two quasi-particles carries one particular property of the electron, the spinon carrying its spin and the orbiton carrying the orbital momentum. The separation into two quasi-particles arises from a particular quantum effect and taken together they still describe the original electron. Even though the two quasi-particles can propagate independently, they cannot leave the material they were formed in. This result is reported in a paper published in Nature by an international team of researchers led by experimental physicists from the Paul Scherrer Institute (Switzerland) and theoretical physicists from the IFW Dresden (Germany).

<http://swissinnovation.org/news/web/2012/08-120418-69.html>

(PSI, April 18, 2012)



### Water Changes the Structure of an Antibiotic

EPFL chemists have shown how the three-dimensional shape of an antibiotic changes when it is in an aqueous environment. This could lead to a better understanding of how drugs interact with biological molecules. Biomolecules often exist in aqueous environments; this is the case in the human body. But water isn't just a neutral environment; it can also interact with the molecules and change their structure. Scientists from EPFL's Laboratory of Molecular Physical Chemistry have shown how the 3D structure of gramicidin – a natural antibiotic – changes depending on the number of water molecules surrounding it. This research could lead to progress in designing new drugs that could be used against diseases such as epilepsy, cancer and Alzheimer's disease.

<http://swissinnovation.org/news/web/2012/08-120420-4e.html>

(EPFL, April 20, 2012)

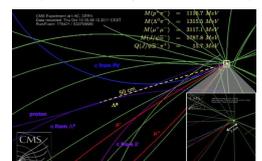


### New Particle Observed at CERN

The CMS Collaboration has announced the observation of a new particle at the CMS experiment at CERN. The analysis of the experimental data, led by researchers from the University of Zurich, has revealed the new particle  $\Xi^* b_0$  in 21 events, corresponding to a significance of over 5 standard deviations above the expected background. It is a baryon, that is, it is made of three quarks and has a mass of 5945 MeV, which is roughly the mass of a lithium atom. The baryon has been detected by looking for a characteristic cascade of decays, resulting in a final state of one proton, two muons, and three pions. The existence of the baryon has long been predicted by the quark model but so far had escaped detection.

<http://swissinnovation.org/news/web/2012/08-120427-ef.html>

(CERN, April 27, 2012)



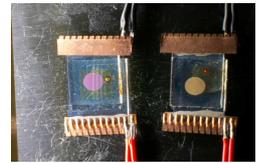


## Solar Cells from Abundant Metals

(UNIBAS, May 02, 2012)

Dye-sensitized solar cells consists of the semiconductor titanium oxide to which a dye is applied. The dye absorbs sun-light and passes electrons to the semiconductor, thereby producing an electric current. Researchers from the University of Basel have found a new strategy to fix the dye on the surface of the titanium oxide nano-particles. Furthermore, they were able to show that a dye based on simple zinc compounds can be used in the solar cell. Until now, most of the dyes in dye-sensitized solar cells were based on compounds involving ruthenium. Compared to the rare, and therefore pricy, ruthenium, zinc is one of the most abundant metal in the earth's crust. The result has been published in the journal Chemical Communications.

<http://swissinnovation.org/news/web/2012/08-120502-6e.html>



## Amplifying Randomness

(ETH Zurich, May 10, 2012)

Classical physics is deterministic. Quantum theory, on the other hand, states that there exist processes which are fundamentally random. For instance, the outcomes of measurements of quantum particles seem to be determined entirely by chance. Up to now there has been no proof either that the world is purely deterministic and all randomness is due solely to a lack of knowledge about certain events, or that everything happens purely by chance. However, ETH Zurich physicists have now succeeded in showing in a thought experiment that randomness can be amplified. They made use of entanglement and locality to show that beyond a certain point "weakly" indeterministic situations can be amplified to such an extent that they are completely random. The results have been published in the journal Nature Physics.

<http://swissinnovation.org/news/web/2012/08-120510-d8.html>



## Electron Traffic Jam

(EPFL, May 16, 2012)

Electrons within some materials can stick together like cars on a traffic jam. EPFL researchers studying promising materials for the future of electronics have been able to highlight this phenomenon. Researchers at the Ultrafast Microscopy & Electron Scattering laboratory (Lumes) at EPFL have highlighted some situations where the flow of electrons can be disrupted. The results of their study were recently published in the scientific journal PNAS. The scientists focused on a material with a distinctive structure that causes electrons to move in a single line of atoms. They found that these electrons could sometimes stick together, as it happens in a slow-down caused by a traffic overload on the highway. This causes the material to pass from being a conductor to becoming an insulator.

<http://swissinnovation.org/news/web/2012/08-120516-6a.html>

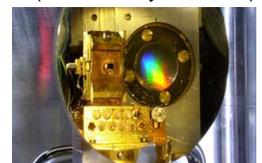


## Superconductivity Physics

(UNIFR, May 29, 2012)

Superconductivity allows electricity to be transmitted without resistance, and is one of the more useful applications of quantum physics. However, which physical phenomena allow for superconductivity is unknown. An international research team, including members from the University of Fribourg, has discovered a strong coupling between crystal lattice vibration and magnetic alignment in certain high-temperature superconductors. The material, when excited by a short polarized laser pulse, almost immediately aligns its spins. Further research into the connection between this phenomenon and superconductivity is required.

<http://swissinnovation.org/news/web/2012/08-120529-13.html>



## 9. Architecture / Design

### Architecture Prizes

(ETH Zurich, April 02, 2012)

Two projects led by architects from ETH Zurich won a Global Holcim Award in 2012, comprising one gold and one silver winner. One award is for a multifunctional community center in a Sao Paulo favela. It includes arts and sports facilities, water and transportation infrastructure, and terraced public space. The other award is for a new concrete casting technol-





ogy that allows complex shapes to be made without wasting large amounts of mold material. The molds are made using computer-aided design and the forms can be cast on site. Overall, 53 regional Holcim awards were chosen from over 6000 entries.

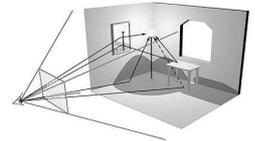
<http://swissinnovation.org/news/web/2012/09-120402-50.html>

### **New Window Glass To Harness Natural Light**

The newest generation of window glass has complex properties that allow light to be directed towards the ceiling or the interior of a room so that optimal use of available light can be made. The glass also minimizes glare and prevents overheating. The challenge for architects is knowing how to best use this glass. Researchers at EPFL developed a database and simulation of complex glass that allows relevant parameters to be easily specified and that outputs intuitive graphics and statistics of how various windows affect lighting in a room. This tool is available openly and freely to architects and designers.

<http://swissinnovation.org/news/web/2012/09-120507-61.html>

(EPFL, May 07, 2012)



### **Massive Building Moved by 60m**

In the largest undertaking of its kind in Europe, a 6,200-ton building has successfully shifted in one piece 60 meters westward after a 19-hour journey. The old management building of the former machine factory Oerlikon in Zurich had to make way for some new railway tracks. The brick building is 123 years old and is the last relic of Oerlikon's 19th-century industrial zone. In 1876, the Oerlikon machine factory "Maschinenfabrik Oerlikon (MFO)" began manufacturing tool machinery, weapons and electric locomotives. When its recent owner ABB announced plans to tear it down, the public handed in a petition to save it, emphasising its cultural importance for the region. Together with the new owner Swiss Prime Site and the Swiss Federal Railways, ABB came up with the alternative plan to have the entire building moved in one piece.

<http://swissinnovation.org/news/web/2012/09-120523-a5.html>

(swissinfo.ch, May 23, 2012)

## **10. Economy, Social Sciences & Humanities**

### **Radioactive Waste Storage Decision Process**

Researchers at ETH Zurich recently studied how people view the decision process for choosing a radioactive waste storage location. Using conjoint analysis method, they studied process openness, distribution equitableness, and actual process result. Questions were posed in a survey that forced participants to trade off deeply-held beliefs. The results of the survey show that people value most highly the fairness and openness of the decision making process. Having a storage facility actually being built instead of using above-ground storage was also valued very highly. As Switzerland continues to contemplate its radioactive waste storage options, these are important factors to consider.

<http://swissinnovation.org/news/web/2012/10-120402-5c.html>

(ETH Zurich, April 02, 2012)



### **Effect of Mood on Decisions**

Psychologists at the University of Basel have been studying the effect of mood on how people make decisions. They studied this in the framework of sequential decisions, specifically people accepting or passing up offers for a certain type of product. Early acceptance could lead to choosing an expensive product, but late acceptance could mean passing up the best offer. The study showed that older adults tended to accept an offer earlier than younger ones. It also showed that people in a good mood were more likely to accept an early, suboptimal offer. All study subjects had approximately equivalent education levels.

<http://swissinnovation.org/news/web/2012/10-120410-7f.html>

(UNIBAS, April 10, 2012)

### **New Civilian Peacebuilding Course**

Starting in September 2012, swisspeace and the University of Basel will offer for the first time a one-year postgraduate program in civilian peacebuilding (Certificate of Advanced Studies CAS). The course is designed for practitioners interested in deepening their knowledge of civilian peacebuilding as well as career starters and career

(swisspeace.ch, May 09, 2012)



changers who aim at working in fields such as peacebuilding, development cooperation, human rights, humanitarian or social work. During 20 course days, renowned academics and experienced practitioners will provide conceptual inputs and practical tools for civilian peacebuilding. They reflect on current trends and challenges in the fields of Conflict and Peacebuilding in Fragile States, Mediating Peace, Dealing with the Past, Peacebuilding Analysis and Impact and Business and Peace. Registration is open until 30 June.

<http://swissinnovation.org/news/web/2012/10-120509-40.html>

## 11. Technology Transfer / IPR / Patents

### Swiss Start-up National Team

(Venturelab, April 04, 2012)

This year, twenty Swiss entrepreneurs from a pool of 100 were selected by venturelab for the Swiss "start-up national team". venturelab is a national startup training program financed by the Commission for Technology and Innovation. The team will travel to Boston in June for a 10-day business development program. They will also pitch their ideas at venture ideas @ EPFL. This program allows the entrepreneurs to make important contacts in the US and to refine their business plans.

## 12. General Interest

### Study on Gender Equality in Science

(swissinfo.ch, April 30, 2012)

An ongoing national research program is studying gender inequality in science and engineering in Switzerland, where just 18 percent of scientists and engineers are women. Although legally both genders have equal protection, workplace culture has a large effect on equality. For women on an academic track, taking a break for children can have a large negative effect on a career. The research so far points to a few measures to improve gender equality, including increased mentoring for women, separating girls from boys for certain school subjects, and improving the support system for mothers, such as better access to child daycare. The final report will be delivered in 2014.

<http://swissinnovation.org/news/web/2012/12-120430-27.html>

### Berne on Top among Most Livable Cities

(SCCIJ, May 11, 2012)

A recent study ranked global cities for the best living conditions for expatriates. The study looked separately at how Asian and European expatriates ranked cities. The study looked at several factors, including climate, availability of health services, housing and utilities, isolation, access to a social network and leisure facilities, infrastructure, personal safety, political tensions, and air quality. Bern rank highly for both European and Asian expatriates. In Asia, Hong Kong ranked highly, while Japanese cities had a reduced score due to the effects of the recent earthquake and tsunami.

<http://swissinnovation.org/news/web/2012/12-120511-d3.html>

## 13. Calls for Grants/Awards

### Post Doc Fellowship Program in Plant Sciences

(plantfellows.ch, April 30, 2012)

PLANT FELLOWS is a new international post doc fellowship program in the field of plant sciences. It is centrally managed at the Zurich-Basel Plant Science Center. The Zurich-Basel Plant Science Center is a competence center of three Swiss universities, the University of Zurich, the University of Basel and the ETH Zurich. The University of Zurich will act as the coordinator of PLANT FELLOWS. The fellowship program is open to applicants from all over the world. The three application windows are June until August and October until December in 2012, as well as February until April in 2013. PLANT FELLOWS offers 66 new post doc fellowships spread between three different schemes a structured training program, including workshops, dedicated training in complementary skills and industrial placements.

<http://swissinnovation.org/news/web/2012/13-120430-54.html>



## Upcoming Science and Technology Related Events

### Seminars in Information Security and Cryptography “Information Security and Cryptography - Fundamentals and Applications”

June 11 - 13, 2012

<http://www.infsec.ch/seminar1.html>

IT

Courtyard Zurich North, Zurich

### Seminars in Information Security and Cryptography “Building Secure Software Systems”

June 14 - 15, 2012

<http://www.infsec.ch/seminar2.html>

IT

Courtyard Zurich North, Zurich

### 16th ETH-Conference on Combustion Generated Nanoparticles

June 24 – 27, 2012

[http://www.lav.ethz.ch/nanoparticle\\_conf/](http://www.lav.ethz.ch/nanoparticle_conf/)

Nanoparticles

ETH Zentrum, Zurich

### 10th European SOFC Forum

June 26 – 29, 2012

<http://www.efcf.com/>

Fuel cell

KKL Lucerne, Lucerne

### Seminars in Information Security and Cryptography “Wireless and Mobile Network Security”

July 3 - 4, 2012

<http://www.infsec.ch/seminar3.html>

IT

Courtyard Zurich North, Zurich

### Seminars in Information Security and Cryptography “Applied Information Security, Hands-on!”

July 5 - 6, 2012

<http://www.infsec.ch/seminar4.html>

IT

Courtyard Zurich North, Zurich

### 4th International Disaster and Risk Conference IDRC Davos 2012 "Integrative Risk Management in a Changing World"

August 26 – 30, 2012

[http://idrc.info/pages\\_new.php/IDRC-Davos-2012/831/1/](http://idrc.info/pages_new.php/IDRC-Davos-2012/831/1/)

Disaster/risk management

Congress Center Davos, Davos

### 2nd Biomarker Europe Summit

September 5 - 7, 2012

<http://www.gtcbio.com/newsletter/BMeu-w.htm>

Biomarker

Zurich

### World Medtech Forum 2012

September 25 - 27, 2012

[http://www.medtech-forum.ch/en/medtech\\_messe/startseite.htm](http://www.medtech-forum.ch/en/medtech_messe/startseite.htm)

Medical technology

Lucerne Exhibition Center, Culture and Congress Center KKL

Luzern and the host Hotel Schweizerhof, Lucerne

### 4th European PEFC and H2 Forum

July 2 - 5, 2013

<http://www.efcf.com/events/>

Fuel cells/hydrogen production, storage & infrastructure

Lucerne

## Science-Switzerland Back Numbers

<http://www.swissinnovation.org/Science-Switzerland>

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