



Science-Switzerland, June-July 2012

News on Swiss science, technology, education and innovation

Table of Contents

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

Switzerland Again Most Innovative Country

(SCCIJ, July 06, 2012)

Switzerland, Sweden and Singapore are the three most innovative countries in the world, according to the Global Innovation Index 2012, a ranking of 141 countries co-produced by the business school INSEAD and the World Intellectual Property Organization. The rest of the top ten this year are: Finland, the United Kingdom, the Netherlands, Denmark, Hong Kong (China), Ireland and the United States. Whether INSEAD and WIPO regarded creative outputs or knowledge and technology outputs, Switzerland was clearly ahead of the pack. There are clearly lessons to learn from what happens in Zurich, Basel or Lausanne about how Swiss companies and universities have been able to maximize knowledge creation across the national economy, especially through university-business links.



<http://swissinnovation.org/news/web/2012/00-120706-22.html>

1. Policy

Energy Research Program

(admin.ch, June 01, 2012)

The Federal Council has decided to pursue additional funding for research into energy to support the new Swiss Energy Strategy 2050. The plan is to provide 202 million Swiss Francs from 2013 to 2016, which will create seven centers of excellence, thirty university research groups, and forty professorships. A working group is putting together a detailed plan that will go before parliament in the fall. Open questions include not only the technical subjects of the research program, but also how to best achieve market integration of the research results and how to coordinate the activities of the several universities that will participate under this program.

<http://swissinnovation.org/news/web/2012/01-120601-e4.html>

Environmental Policy Agreement with China

(BAFU, June 28, 2012)

Switzerland and China have signed a Memorandum of Understanding to increase cooperation on environmental policy issues such as air pollution control, water protection, waste management, and nature protection. The agreement was based on talks between Federal Councillor Leuthard and minister Shengxian during a working visit to Beijing in February. The agreement enables more exchange of policy and technical information, and can include industry and academia. The agreement expands on previous agreements between the two countries.

<http://swissinnovation.org/news/web/2012/01-120628-72.html>



3. Life Science

Key Mechanism of Measels Infection

(UNIBE, June 01, 2012)

An international research team lead by the scientists from the University of Berne has succeeded in identifying a mechanism that allows paramyxoviruses to enter their host cells. Paramyxoviruses are responsible for a wide range of fatal diseases, as for example measles, which even today cause over 120'000 deaths per year in developing countries. It has been a longstanding mystery how exactly the paramyxoviruses enter their host cells. The researchers were now able to identify the process that causes the binding protein -- which connects to receptors on the host cell membrane -- to activate the fusion protein that causes pores in the cell membrane to open. As all paramyxoviruses rely on this kind of process, the researchers hope that preventing it could lead to an effective treatment.

<http://swissinnovation.org/news/web/2012/03-120601-fe.html>

Cellular Calculator

(ETH Zurich, June 04, 2012)

Researchers at ETH Zurich were able to create a cellular calculator using a complex genetic network in a mammalian cell. They created a biological version of an AND gate, which is a common component in electronic circuitry and which allows for performing basic mathematical operations. The logic gate takes the apple molecule phloretin and antibiotic erythromycin as input signals and generates an output if both inputs are present. In the future, such a mechanism could be used for smart therapeutic treatments that monitor cell metabolism for diseases and release treatment substances. At the time, this research is still new and needs much more development to reach such an advanced stage.



<http://swissinnovation.org/news/web/2012/03-120604-63.html>

Imaging Alzheimer's Amyloid Plaque

(PSI, June 05, 2012)

Swiss researchers are developing a new method to study amyloid plaque on brain cells, one of the earliest symptoms of Alzheimer's disease. Current methods for detecting plaque either are not very precise, or they require manually dissecting the brain and imaging each slice separately. The new method uses Phase Contrast Imaging (PCI) to build an accurate 3D image of the plaque. PCI uses x-rays from the Swiss Light Source and then very accurately measures how they are deflected by different brain tissues. This is more precise than traditional x-ray imaging, which only measures attenuation. The same method can be used to detect other diseases, such as tumors.



<http://swissinnovation.org/news/web/2012/03-120605-cb.html>

Great Health Benefits from "Hidden Vitamin"

(EPFL, June 06, 2012)

A Lausanne-based research team has identified a molecule naturally present in milk and other foods, nicotinamide riboside (NR), that has extraordinary health benefits. In an article in the journal Cell Metabolism, Johan Auwerx, head of EPFL's Laboratory of Integrative Systems Physiology (LISP) describes a series of experiments done using nicotinamide riboside, a molecule that, although known to indirectly influence the activity of mitochondria, the "powerhouses" of the cell, has been little studied up to this point. The results suggest that NR plays a role in preventing obesity and diabetes, increasing muscular performance, and improving energy expenditure. These beneficial effects aren't the only advantages of this "hidden vitamin." Beside the fact that it is naturally present in many foods, the researchers didn't observe any side-effects.

<http://swissinnovation.org/news/web/2012/03-120606-90.html>

Predicting the Formation of New Species

(Eawag, June 10, 2012)

When animals or plants colonize new habitats, a number of new species may evolve from a single ancestor. But it is difficult to predict on the basis of environmental conditions or species-specific traits alone whether and to what extent diversification will occur. An Eawag study of African lake cichlids has now shown what combination of extrinsic factors and intrinsic traits leads to high rates of speciation, thus promoting biodiversity. According to the study, diversification is more likely to occur in deep lakes and in areas with relatively high solar radiation. By contrast, lake size has practically no influence on the likelihood of. Among the species-specific traits, the





intensity of sexual selection was shown to be a key factor, as indicated by the association between sexual dichromatism and diversification.

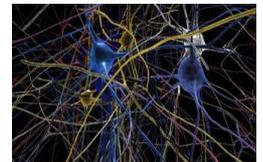
<http://swissinnovation.org/news/web/2012/03-120610-ba.html>

Neuroscience Center

EPFL and the universities of Lausanne and Geneva, together with the help of their home cantons, the Swiss Confederation, and Rolex, are launching a new project named NEURO-POLIS, which aims to promote neuroscience research in the region. Two research centers will be built, one in Lausanne and one in Geneva, and they will include areas for the general public to learn about neuroscience. The Geneva center will house the new Institute of Translational Molecular Imaging. The three host universities are already home to several neuroscience research projects.

<http://swissinnovation.org/news/web/2012/03-120611-f5.html>

(EPFL, June 11, 2012)



Epo Doping Drug Impacts Brain

The doping drug Epo is used to increase red blood cell count and thus improve blood oxygen transport. However, new research at the University of Zurich shows that Epo also produces an increase in motivation shortly after injection before the red blood cell count increases. In mice, Epo was shown to increase their performance on the treadmill even without the physical effects. Epo could potentially be used to treat depression or to alleviate certain symptoms of people with schizophrenia.

<http://swissinnovation.org/news/web/2012/03-120611-87.html>

(UZH, June 11, 2012)



Fish Evolution

The three-spined stickleback is a model organism for studying evolutionary biology. It is in the process of differentiating into two different species, one resident in rivers and the other in lakes. Differences in their DNA are already visible, with stronger differences in the middle of chromosomes than at the ends due to the recombination process. The next research step will be to determine the function of each chromosome to understand how the two populations of fish are adapting to their respective environments.

<http://swissinnovation.org/news/web/2012/03-120612-79.html>

(UNIBAS, June 12, 2012)



Respiratory Tract Infections

One of the leading causes of death in cystic fibrosis patients is a chronic respiratory tract infection. Researchers recently learned that genetic mutations in these patients can help the infection-causing pathogen to survive persistently in the lungs. The genetic mutations affect three proteins, which are signaled to produce a sticky biofilm. This biofilm, in turn, protects the pathogen *Pseudomonas aeruginosa* from antibiotics and the immune system. With this new knowledge, the researchers hope to find better ways to fight chronic respiratory tract infections.

<http://swissinnovation.org/news/web/2012/03-120618-a5.html>

(UNIBAS, June 18, 2012)

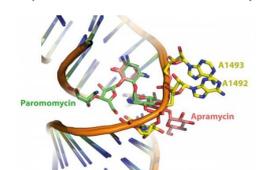


Reduced Side-Effects of Antibiotics

Strong bacterial infections are sometimes treated with a class of antibiotics known as aminoglycosides. These medicines hinder protein creation in the bacteria, thereby killing them. However, they have a similar effect on mitochondria, an essential part of many cells, and this can lead to hearing damage and deafness in humans. Swiss researchers were recently able to modify an antibiotic from this family and remove its negative side-effects, thus setting the stage for improved antibiotics. They were able to develop these new results from their previous research that discovered the link between antibiotics, mitochondria, and deafness.

<http://swissinnovation.org/news/web/2012/03-120618-ba.html>

(UNIZH, June 18, 2012)





Membrane Transport Using Halogen Bond

(UNIGE, June 20, 2012)

Researchers from the University of Geneva have shown the existence of a new type of chemical bond, similar to the hydrogen bond: the halogen bond. Whereas the former works only in water, the latter takes place in fatty environments. Researchers linked a carbon and an iodine atom, and noted that it created an imbalance in the electrons orbiting the iodine atom and an excess respectively deficit of charge on either side of the atom. This positively charged area can bond with negatively charged ions (anions). The team then showed that this system can transport anions through a phospholipid membrane similar to the one found around our cells. The halogen bond works a bit like a buoy, letting anions swim through the membrane's fatty environment.

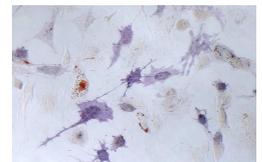
<http://swissinnovation.org/news/web/2012/03-120620-36.html>

Stem Cell Diversification On Polymer Substrate

(ETH Zurich, June 20, 2012)

In 2006, a study on stem cell diversification showed that polymer substrate softness affects the cells' behavior. However, a new study, performed partly at ETH Zurich, shows that there is more to the story. Instead of softness being the important factor, it is instead the structure of the substrate and the number of anchor points that the cells can adhere to that is important. If anchors are close together, then the substrate seems stiff and stem cells turn into bone cells, when they are farther apart then the result is fat cells. Polymer substrate media are important in labs and hospitals, and this research may improve their design.

<http://swissinnovation.org/news/web/2012/03-120620-bb.html>



Fish Fear Coral Change

(UNIL, June 20, 2012)

A study carried out at the University of Lausanne by Nicolas Salamin and Glenn Litsios explains why some fish suffer from transformations in coral reefs. After studying the genealogy of 200 species of damselfish over a timeline of more than 50 million years, the researchers noted that in the course of evolution, herbivorous damselfish changed their habitat far less quickly than their cousins feeding on zooplankton. The herbivores protect their "vegetable plot" and weed out non-edible algae, thereby promoting biodiversity in the reefs. The interaction between these damselfish and the algae they cultivate represents a constraint that prevents them from being able to adapt easily to environmental changes.

<http://swissinnovation.org/news/web/2012/03-120620-15.html>



Three-Dimensional Cell Culture

(EPFL, June 25, 2012)

EPFL spinoff QGel is developing a new three-dimensional cell culture that is an improvement of traditional petri dishes. The system allows three-dimensional effects to be studied. For example, tumors become deprived of oxygen as they grow in three dimensions. The gel used in the system emulates an extracellular matrix, creating conditions similar to those seen by in vivo cells. It provides a realistic enough environment that the system can be used to replace in vivo experiments with in vitro ones. Lastly, the cell culture system is easily used with robots, allowing for quick large-scale tests.

<http://swissinnovation.org/news/web/2012/03-120625-f0.html>

New Center of Excellence in Oncology

(UNIL, June 29, 2012)

Hailing from Philadelphia where he founded the Ovarian Cancer Research Center at the University of Pennsylvania, George Coukos, aged 50, is one of the leading figures in cancer immunotherapy. In French-speaking Switzerland, the professor will run the Ludwig Centre of the University of Lausanne and establish a new CHUV-UNIL Department of Oncology. This international center of excellence will bring together multiple clinical and scientific competencies and create new synergies with pharmaceutical firms. The aim is to develop innovative and personalized therapeutic approaches that are based on harnessing molecular understanding of tumors, targeted drugs and immune therapy. The latter aims at reconfiguring the patients' immune cells so that they can recognize and combat the tumor.

<http://swissinnovation.org/news/web/2012/03-120629-29.html>



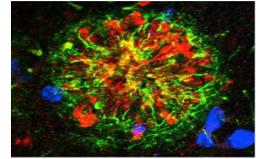


Alzheimer's Disease Facilitated by Chronic Inflammation in the Brain

(UZH, July 02, 2012)

To date it has been difficult to pin down the role of inflammation in Alzheimer's disease. Researchers from the University of Zurich, in collaboration with colleagues from the ETH Zurich and University of Bern investigated what impact immune system challenges similar to having a severe viral infection would have on the development of Alzheimer's disease in mice. Results showed that a single infection before birth during late gestation was enough to induce long-term neurological changes and significant memory problems at old age. Based on the similarity between amyloid precursor protein / amyloid β aggregates in mice and those found in human Alzheimer's disease, it seems likely that chronic inflammation due to infection could be an early event in the development of Alzheimer's disease.

<http://swissinnovation.org/news/web/2012/03-120702-b7.html>

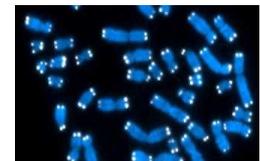


Immortality Mechanism of Cancer Cells

(EPFL, July 05, 2012)

At the ends of every chromosome there is a special sequence of DNA known as a telomere, whose length is governed by the telomerase enzyme. Every time the cell divides, it is shortened, and when the telomere finally runs out, the cell dies. But occasionally, a cell will mutate and reactivate production of the enzyme, so that when the cell divides, the telomere gets longer instead of shorter. This is what gives cancer cells their immortality. The EPFL team identified three proteins that join together and then attach themselves to the telomere. This protein complex prevents telomerase from acting on the telomere. But in the cancer cell, their timing is off – their involvement takes place too late. If these proteins could be made to act earlier the cancer cell would no longer be immortal.

<http://swissinnovation.org/news/web/2012/03-120705-fc.html>



Origin of Follicular Dendritic Cells

(UZH, July 05, 2012)

Researchers at the University of Zurich have discovered the origin of follicular dendritic cells (FDCs), which play a key role in the autoimmune system, but which can also be harmful to the body. Normally, they provide a structure to trap antigens, thereby training B lymphocytes to recognize invaders. However, they can also protect infectious pathogens such as HIV and prions. The researchers hypothesized that FDCs arose from blood vessels, specifically mural cells. Several experiments with mice confirmed that mural cells losing their expression of a specific receptor matured into FDCs. This research will help better understand diseases related to FDCs, such as chronic inflammation and AIDS.

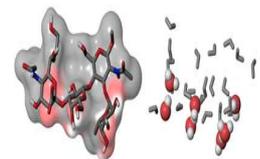
<http://swissinnovation.org/news/web/2012/03-120705-66.html>

Therapeutic Approach with Sugar Molecules to Inflammatory Diseases

(UNIBAS, July 06, 2012)

Sugar molecules play an important role in molecular-biological processes of signal transmission and recognition between cells. Selectines are proteins that interact with sugars and are gaining increasing importance as therapeutic target molecules. They are thought to play a center role in the development of inflammations, such as in asthma, psoriasis, and rheumatoid arthritis. So far, the interaction between selectines and the sugar sLex has largely been unexplained. The researchers at the University of Basel were now able to show that the part of sLex that interacts with the proteins is formed like a cluster of water molecules. By identifying this binding mechanism, the researchers made an important contribution to the exploitation of selectines as therapeutic target molecules.

<http://swissinnovation.org/news/web/2012/03-120706-e8.html>

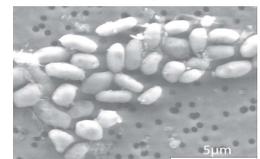


Arsenic-based Life

(ETH Zurich, July 09, 2012)

In 2010, NASA announced that it had found evidence for arsenic-based life in the GFAJ-1 bacterium, where arsenic replaced phosphorus as a key building block of life. Now, ETH Zurich researchers have refuted this claim. They show that any arsenic found in the GFAJ-1 bacterium is the result of a spontaneous process and is not actively formed or metabolized by the bacterium. GFAJ-1 is very efficient at consuming phosphorus, so even trace amounts of the nutrient in its arsenic-rich environment are sufficient to maintain its life. In other words, arsenic-based life is still not possible to the best of our knowledge.

<http://swissinnovation.org/news/web/2012/03-120709-0b.html>





Reducing Resistance to Radiation

Although targeting cancer cells, radiation therapy also modifies tissue surrounding a tumor. Using breast cancer models in the laboratory, researchers from University of Fribourg have identified mechanisms of resistance to radiation, and white blood cells responsible for this resistance. Then, by inhibiting the c-Kit receptor expressed on the surface of these cells, it was possible to improve the radiation therapy's efficacy and reduce the risk of cancer's progression. These lab results could find practical results in monitoring patients' response to radiation therapy.

<http://swissinnovation.org/news/web/2012/03-120709-20.html>

(UNIFR, July 09, 2012)

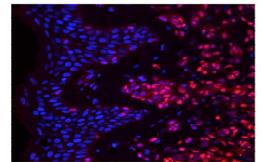


Melanoma-Promoting Gene Discovered

The newest theory behind tumors is that malignant stem cells are responsible for forming tumor cells. Melanoma is one type of cancer that is particularly aggressive. Researchers at the University of Zurich have discovered a gene that plays a key role in stem cell development and that can be targeted to stop tumor formation and growth. The gene, known as "Sox10", regulates cell division and stem cell survival. The researchers showed that suppressing the gene in mice stopped the spread of cancer. This research can have a significant benefit for research into cancer treatments that target stem cells.

<http://swissinnovation.org/news/web/2012/03-120710-e3.html>

(UZH, July 10, 2012)

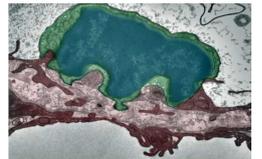


Mechanism on How Metastasizing Cancer Cells Infiltrate Organs Identified

Every year, over seven million people die of cancer worldwide. In industrial nations, the vast majority die from the consequences of metastasis, namely secondary tumors. These develop from metastases of the primary tumor by spreading via the patient's bloodstream. Until now, it has been unclear as to how these secondary cells were able to enter the tissue of other organs from the bloodstream. Now, a European team headed by researchers from the University of Zurich has identified the mechanism that helps metastasizing intestinal cancer cells to infiltrate the organs. The team demonstrated that cancer cells manipulate specific "doorman receptors" on the endothelium of the blood vessels. The mechanism discovered could yield a completely new approach for the development of drugs to combat metastasis in breast, prostate and bowel cancer.

<http://swissinnovation.org/news/web/2012/03-120711-11.html>

(UZH, July 11, 2012)

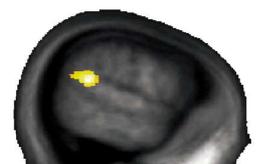


Source of Altruism

Researchers at the University of Zurich have found a link between brain anatomy and altruism, or selfless behavior. They showed that people with greater amounts of grey matter at the junction between the parietal and temporal lobes behaved more altruistically and displayed a greater amount of brain activity in this area. This part of the brain is believed to enable a person to imagine him- or herself in another person's place. It is important to note that neurobiological factors are not the only factors influencing altruism, and that social processes also have a strong effect.

<http://swissinnovation.org/news/web/2012/03-120711-bb.html>

(UZH, July 11, 2012)



Mass Spectrometric Verification of Cancer Biomarkers

Protein biomarkers, especially those that circulate in the blood plasma or urine and can therefore be obtained without any major intervention, are vital in personalized medicine. However, the majority of the protein biomarkers proposed and recorded in the literature do not progress beyond the status "potential", as there has been a lack of a verification procedure for most biomarker candidates. Researchers at ETH Zurich have now developed a strategy to measure potential biomarkers rapidly on a large scale and verify their clinical uses. The method is based on a targeted mass spectrometric, high-throughput technology, which can determine proteins that are present in biological samples at any particular point in time in a reliable and reproducible way.

<http://swissinnovation.org/news/web/2012/03-120712-d5.html>

(ETH Zurich, July 12, 2012)

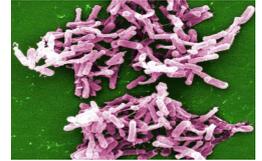




New Treatment Against Disease-Causing Intestinal Bacteria

(ETH Zurich, July 23, 2012)

Researchers from ETH Zurich have developed a novel treatment against disease-causing intestinal bacteria. Unlike common therapies that depend on antibiotics to fight the bacteria - and wipe out the intestinal flora in the process - the new approach only targets the toxins released by the bacteria. The specially designed molecules are administered orally, enter the digestive tract, and neutralize the toxins there. Because these molecules never enter the body and its cells, there are no expected side-effects. Due to the fact that the treatment targets the toxin rather than the bacteria, it is also unlikely that the bacteria will develop resistances against the new drug.



<http://swissinnovation.org/news/web/2012/03-120723-4e.html>

Mass Testing of Diabetes Drugs

(UNIGE, July 26, 2012)

Researchers from the University of Geneva have found a way to test thousands of molecules for their efficacy in preventing diabetes. The beta cells in the pancreas produce insulin which controls blood sugar levels, and among the many factors that govern their proper functioning is the protein Cx36. Without this protein, the synchronization of the beta cells is lost and insulin production goes out of control. The researchers developed a non-invasive analysis of the functioning of Cx36. They created a new model using living cells producing insulin and Cx36 to rapidly test a large number of molecules. With this innovative approach, they analyzed 1040 molecules, thus identifying compounds inhibiting Cx36 and others stimulating it. This opens the way for new strategies for pharmacological treatment of type II diabetes.

<http://swissinnovation.org/news/web/2012/03-120726-6d.html>

New Artificial Species Through Genetic Barriers

(UNIBE, July 26, 2012)

Prof. Eduardo Moreno from the University of Bern has found a way to construct artificial genetic barriers between species such that they are unable to interbreed. He modified the genetic material of fruit flies (*Drosophila melanogaster*) in such a way that they exhibit characteristics of a new, separate species, *Drosophila synthetica*. Among others, members of this new species are unable to breed with members of the natural one while still being able to breed within themselves. By introducing such genetic barriers in genetically modified organisms, the researcher hopes to reduce the risk in genetic engineering of having modified organisms mix with the natural species, such as in genetically modified crops.



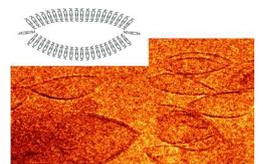
<http://swissinnovation.org/news/web/2012/03-120726-8d.html>

4. Nano / Micro Technology / Material Science

Nano-Containers Used in Treatment of Constricted Blood Vessels

(UNIBAS, June 10, 2012)

Researchers have created nano-containers for the treatment of constricted blood vessels in arteriosclerosis. Cardiovascular diseases are the primary cause of death nowadays, with over 20'000 deaths per year in Switzerland alone. The containers can transport drugs directly to the site of the constriction and largely avoid side-effects of current non-targeted treatments. The researchers exploited increased shear stresses that act on the nano-containers in the blood stream at the constricted areas to make them release the drugs locally where they are needed. They modified naturally occurring molecules such that they form lens-shaped containers instead of spheres, leading to controlled breaking-points to release the contained drugs. The results have been published in the journal *Nature Nanotechnology*.



<http://swissinnovation.org/news/web/2012/04-120610-88.html>

Mass Produced Composite Materials

(EPFL, June 13, 2012)

Composite materials, such as fiberglass, are lightweight yet strong. However, they are also time consuming to manufacture, so their use has been limited to aerospace, sailing, and high-performance racing applications. An EPFL spinoff, EELCEE, is changing that with a new manufacturing technique similar to pressure-injected plastic. A mold is created into which fibers are laid and resin is injected. Different filament textures can be used for different





applications. The company has already attracted investors, and is looking to the automobile industry for a customer. They hope to have composite products in the market by next year already.

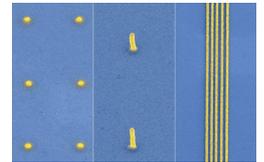
<http://swissinnovation.org/news/web/2012/04-120613-4e.html>

Nano Printing

(ETH Zurich, June 13, 2012)

Researchers at ETH Zurich have developed a new technique for printing at the nano scale. Their system uses a capillary print head and an electrical field that precisely deposits ink with nano particles and so builds structures, including small towers. Furthermore, their process does not require exceptional environmental conditions like other methods, and is relatively fast. The researchers envision many uses, including building antennas to manipulate light. Such antennas could improve solar cell efficiency, make for better camouflage, or make sensors more sensitive. Other products could be printed too, perhaps even CPUs. The researchers are now working to improve their product with multiple print heads, and are even considering creating a spinoff company.

<http://swissinnovation.org/news/web/2012/04-120613-31.html>



Partnership between Max-Planck-Gesellschaft and EPFL in Nanosciences

(EPFL, July 16, 2012)

Max Planck Gesellschaft (MPG) will open an International Center dedicated to nanosciences at EPFL. The German institution, renowned for its 17 Nobel Prizes and 80 institutes, has already established international research centers throughout the world, including centers at Princeton University, the National Centre for Biological Sciences in Bangalore and the Weizmann Institute in Israel. With EPFL, the institution will establish the Max Planck-EPFL Centre for Nanosciences and Molecular Technologies. The partnership includes the creation of a laboratory in Lausanne, the organization of joint summer schools and conferences, and funding for projects and theses that will be co-directed by the two institutions. The agreement was signed July 16, 2012, on the EPFL campus.

<http://swissinnovation.org/news/web/2012/04-120716-bc.html>

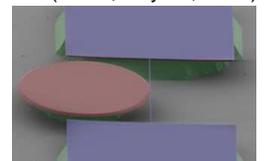


Rapid, Precise Opto-Mechanical Measurement

(EPFL, July 26, 2012)

EPFL scientists have developed a rapid, precise opto-mechanical measurement system that can be embedded into a silicon chip. Resonators use microscopic strings to identify particles by analyzing the vibration they induce in the string upon impact. The main obstacle to the measurement is Brownian motion. The EPFL team was able to develop a technique that diminished the effect of Brownian motion at room temperature. One laser, the "probe," detects movements in the string. The signal is processed in real time and used to modulate a second laser, the "control," to counteract the effects of the Brownian motion by exerting a counterforce on the string. Using this innovative technique, the scientists were able to reduce the time between measurements 32-fold, while operating at about 20 °C.

<http://swissinnovation.org/news/web/2012/04-120726-70.html>



5. Information & Communications Technology

Energy Efficient Water-Cooled Supercomputer

(IBM Research Zurich, June 18, 2012)

IBM and the Leibnitz Supercomputer Centre have created the first commercially available supercomputer cooled with a hot water cooling system that has coolant reaching temperatures of 45 degrees Celsius. At three petaflops, the computer is also the most powerful computer in Europe. In contrast to traditional air cooling, water cooling is several orders of magnitude more efficient. In fact, air cooling can use up to fifty percent of a computing center's energy. Water cooling helps drive down energy costs significantly, and the heat can be reused to heat the building in winter. Energy efficiency is increasingly important as state funded institutions in Germany, where this computer is located, are now required to buy energy from renewable resources only.

<http://swissinnovation.org/news/web/2012/05-120618-51.html>





Phone-based Behavior Prediction

(EPFL, June 22, 2012)

A team of EPFL students recently won a contest to develop an algorithm that predicts where a person will go next based on their mobile phone data. The team was given a year's worth of data from volunteers that included Wi-Fi and Bluetooth connections, but no GPS data. From this they had to determine a person's typical behavior. To rank the quality of the algorithms, a subset of the data was set aside by the judges and then used for verification. The EPFL team's algorithm operated with a fairly high degree of certainty. Such a system could be used to better target applications based on user behavior, provide certain kinds of notifications, and improve agendas.

<http://swissinnovation.org/news/web/2012/05-120622-5d.html>



6. Energy / Environment

Solar Impulse Lands in Morocco

(Solar Impulse, June 05, 2012)

The Swiss solar-powered aircraft Solar Impulse made its first flight to another continent, landing in Rabat, Morocco. It made the flight from Madrid in just over 19 hours. The goal of the Solar Impulse team is to raise awareness about solar energy. The Moroccan Agency for Solar Energy is hosting the team and together they are sponsoring a week of events. Morocco is actively pursuing solar energy with the construction of thermo-solar power generating facilities. Weather permitting, the Solar Impulse aircraft will fly to Ouarzazate, where the first such facility is located.

<http://swissinnovation.org/news/web/2012/06-120605-24.html>

Solar Cells in Multifunctional Construction Material

(EPFL, June 08, 2012)

Researchers at EPFL have been developing a new construction material based on foam cores and glass fiber reinforced polymer (GFRP). The material combines several functions in one material, providing structural support and insulation. Now, researchers are trying to integrate photovoltaic cells into the surface of the material to provide energy in a flexible and aesthetic manner. When applied thinly, GFRP is almost as translucent as glass, while also providing protection. The solar cells, supplied by IMT Neuchatel, are flexible, allowing for curved surfaces. Thermal properties are being tested, but good progress has been made on the project.

<http://swissinnovation.org/news/web/2012/06-120608-72.html>



Rapid Ocean Acidification

(ETH Zurich, June 14, 2012)

Scientists at ETH Zurich are studying the acidification of the Eastern Pacific Ocean and how it affects the ecosystem along the coast. The coast is naturally abundant because the local currents bring nutrients up from the deep. However, the water is also acidic and increasingly so due to rising atmospheric carbon dioxide levels. As the ocean absorbs carbon dioxide, acidity increases, and this, in turn, dissolves calcium carbonate, an important substance to build shells and skeletons. At the current rate, the ocean will be undersaturated with calcium carbonate in 20 to 40 years, which will have a drastic effect on certain species, such as mussels.

<http://swissinnovation.org/news/web/2012/06-120614-90.html>



Protecting Water Resources

(Eawag, June 22, 2012)

Water provides us with many important resources, including nourishment and electricity. As Switzerland phases out nuclear power, water resources become even more important. Eawag is conducting several research projects to help this cause. On the Spöl River they determined better flow management practices downstream of the Livigno Dam that restored local species populations. In Swiss lakes they are focusing on detecting polluting substances that are hormonally active but difficult to detect using traditional sensors; biological sensors could be used instead. Another project was able to show that the ban on phosphorus in detergents has helped restore endemic species in lakes. They provide further analysis for the continued support of this ban.

<http://swissinnovation.org/news/web/2012/06-120622-94.html>





Wind Energy Ecobalance

(ETH Zurich, June 29, 2012)

Wind turbines are a promising source of renewable energy. Researchers at ETH Zurich recently studied the overall carbon dioxide and energy cycle of wind turbines, including their construction and operation. They found that large wind turbines are generally more efficient than small ones because of the economies of scale. In other words, producing a wind turbine that is fifty percent larger requires less than fifty percent additional energy. The study also looked at the impact of each major subsystem, determining that production of the steel mast is the most harmful, followed by the generator.

<http://swissinnovation.org/news/web/2012/06-120629-88.html>



Hydrogen-Powered Cleaning Vehicles and Public Buses

(Empa, July 06, 2012)

Hydrogen created by using renewable energy sources is a form of power which could free us from our dependency on oil, gas and coal. When hydrogen is used to generate power, it produces no CO₂ as an unwanted byproduct. Examples such as "hy.muve", a hydrogen-powered communal cleaning vehicle, and post buses powered by fuel cell technology, both co-developed by Empa, emit only water vapor as exhaust gas and in addition are very quiet in operation. Empa's energetically independent SELF living quarters uses its own hydrogen plant to generate the gas in summer, storing it in novel metal hydride tanks for heating in winter and cooking all year round.

<http://swissinnovation.org/news/web/2012/06-120706-66.html>



Bacterial Influence on Nuclear Waste Repositories

(EPFL, July 12, 2012)

By interacting with the radioactive waste and the materials used to contain it, underground microorganisms may affect the safety of nuclear waste repositories. In an ongoing research project, scientists from EPFL are cataloguing subterranean microbial life and studying its potential to affect the performance of the protective barriers - canisters, concrete and adjacent rock - that are used to contain nuclear waste. There are several bacterially-driven processes that have the potential to affect the safety of nuclear waste repositories. On the one hand, increased corrosion of metallic waste and containers and production of methane could both weaken the barriers that contain the radioactive waste. On the other hand, the microbes could consume gases that, over time, are likely to build up pressure in the sealed repository.

<http://swissinnovation.org/news/web/2012/06-120712-ab.html>



Empa Joins EU Consortium to Develop Highly Efficient Solar Cells

(Empa, July 13, 2012)

With 13 partners from all over Europe, Empa has launched an EU-funded project to develop affordable, more efficient solar cells. With an overall budget of 10 million Euro, the SCALE-NANO project aims at achieving breakthroughs in the cost-efficiency of photovoltaic devices and modules based on advanced thin film technologies. Devices based on the substance class of chalcogenides, such as copper indium gallium (di)selenide, exhibit the highest efficiencies of all thin film photovoltaic technologies and have already entered the stage of mass production. However, current production methods typically rely on vacuum-based deposition processes that are difficult to control over large surfaces and require expensive equipment. To take up this challenge, the international project will develop alternative, vacuum-free processes based on the electro-deposition of nanostructured precursors.

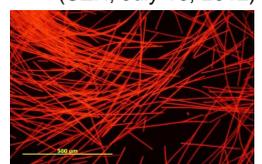
<http://swissinnovation.org/news/web/2012/06-120713-2f.html>



Global Warming Causes Algae Blooms

(UZH, July 16, 2012)

Global warming also affects lakes. Based on the example of Lake Zurich, researchers from the University of Zurich demonstrate that there is insufficient water turnover in the lake during the winter. If the turnover is complete, many cyanobacteria die off in the deep waters of Lake Zurich as they cannot withstand the high pressure. Global warming causes rising temperatures at the water surface. The current values are between 0.6 and 1.2 degrees Celsius above the 40-year average. The winters were increasingly too warm and the lake water was





not able to turn over fully, allowing harmful Burgundy blood algae to thrive. The warmer temperatures are thus compromising the successful lake clean-ups of recent decades.

<http://swissinnovation.org/news/web/2012/06-120716-46.html>

Waste Heat Used For Electricity Production

(ABB, July 19, 2012)

ABB, EKZ GETEC and Jura Cement have signed an agreement to install an ABB system at the Wildegg AG cement plant, which generates power from waste heat. The advanced solution is based on ORC (Organic Rankine Cycle). The ORC process is a thermodynamic process that makes use of an organic fluid with a boiling point lower than water, which enables low temperature energy sources, such as waste heat, to be used effectively to generate electric power. Once the system is in operation, the plant's energy costs are reduced by up to 20%. The system is supported by the Swiss Federal Department of Energy within its program "EnergySwitzerland" as an energy strategic project.

<http://swissinnovation.org/news/web/2012/06-120719-81.html>

7. Engineering / Robotics / Space

World Record Locomotive

(Stadler Rail, June 06, 2012)

The Swiss company Stadler Rail recently sold seven new locomotives to a Brazilian company. The locomotives are the world's largest and most powerful rack-and-pinion locomotives, and will be used on the Sao Paulo to Port of Santos line, which has a 104 per mil grade. The locomotives deliver 5000 kW of power and 760 kN of tractive force. They are 50 percent more powerful than the locomotives currently in use and have improved regenerative capabilities to reduce operational costs. The first two locomotives will be transported to Brazil in June.



<http://swissinnovation.org/news/web/2012/07-120606-bf.html>

Flood Threat to Rail Lines

(EPFL, June 18, 2012)

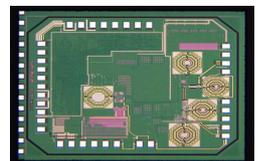
EPFL is conducting a study for the French rail network on the dangers of flooding to rail line integrity. During severe flooding, as happened in Sarry, France in 2000, rushing water can erode rail ballast, thus compromising the safety of the track. Ballast, the rocks laid beneath the rails, is responsible for absorbing vibrations in the rails and transmitting it to the ground below. EPFL built a 1/3-scale model of a rail line and created different scenarios, varying slope, water flow, and obstacles. They found, for example, that certain obstacles, such as bridge supports, could direct water at the base of the ballast and wash it away. The next step will be to design specific safety measures for the infrastructure.

<http://swissinnovation.org/news/web/2012/07-120618-ce.html>

Ultra-Low Power Transceiver Platform

(CSEM, July 25, 2012)

CSEM has developed a new transceiver platform that consumes less than 10 mW and is ideally suited to ultra-low power RF applications such as Bluetooth low energy, WirelessHART, and IEEE 802.15.4. The IcyTRX platform has been designed with the goal of reducing power consumption, as well as allowing the use of small coin cell batteries, thus extending battery life and miniaturization. IcyTRX offers a highly integrated design avoiding external matching components, and yielding a very small sub-2 sq.mm footprint and a variable data rate of up to 2 Mbits/sec. IcyTRX is integrated into a standard digital 90nm CMOS process and is designed to exceed the specifications and requirements of Bluetooth Low Energy, the physical layer of IEEE 802.15.4, as well as proprietary standards.



<http://swissinnovation.org/news/web/2012/07-120725-bc.html>

Major Funding for Light-Weight Drone

(EPFL, July 27, 2012)

The French company Parrot, a world leader in wireless peripherals for mobile phones and already in the market for consumer drones, acquired for 5 million Swiss Francs a majority share in senseFly, a start-up from EPFL. They will also invest 2.4 million Francs in Pix4D, another EPFL spin-off active in the field of 3D image processing. The drone



developed by senseFly, the result of 6 years of research in the Laboratory of Intelligent Systems at EPFL, facilitates the work of experts across various fields. Equipped with an autopilot and a miniature high-definition camera, it is used by hundreds of professionals worldwide. The algorithms developed by Pix4D make it possible to assemble hundreds of aerial pictures and, within minutes, to get an extremely accurate 3D and geo-referenced image of the observed terrain.

<http://swissinnovation.org/news/web/2012/07-120727-77.html>

8. Physics / Chemistry / Math

Neutrinos Don't Exceed Speed of Light

(CERN, June 08, 2012)

At the 25th International Conference on Neutrino Physics and Astrophysics in Kyoto, CERN Research Director Sergio Bertolucci presented results on the time of flight of neutrinos from CERN to the INFN Gran Sasso Laboratory on behalf of four experiments situated at Gran Sasso. The four experiments all measure a neutrino time of flight consistent with the speed of light. This is at odds with a measurement that the OPERA collaboration put up for scrutiny last September, indicating that the original OPERA measurement can be attributed to a faulty element of the experiment's fibre optic timing system. In another development reported in Kyoto, the OPERA experiment showed evidence for the appearance of a second tau-neutrino in the CERN muon-neutrino beam, which is an important step towards understanding the science of neutrino oscillations.

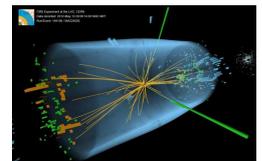
<http://swissinnovation.org/news/web/2012/08-120608-e3.html>

New Particle Discovered at CERN Likely the Higgs Boson

(CERN, July 04, 2012)

The ATLAS and CMS experiments at CERN have presented their latest preliminary results in the search for the long sought Higgs particle. Both experiments observe a new particle in the mass region around 125-126 GeV with a 5 sigma certainty. While it is already clear that the new particle is a boson, further data is necessary to determine if it is indeed the Higgs boson as predicted by the Standard Model of particle physics or maybe something more exotic. The Standard Model describes the fundamental particles from which we, and every visible thing in the universe, are made, and the forces acting between them. All the matter that we can see, however, appears to be no more than about 4% of the total. A more exotic version of the Higgs particle could be a bridge to understanding the 96% of the universe that remains obscure.

<http://swissinnovation.org/news/web/2012/08-120704-c9.html>



Soot in Diesel Particle Filter Made Visible Using Neutron Tomography

(PSI, July 11, 2012)

Nowadays, all diesel motor vehicles are fitted with a particulate filter as part of the Euro5 Emission Standard. These filters prevent the harmful soot and ash particles in exhaust gases from entering the environment. However, within the automotive industry, exactly how the soot particles are deposited inside these filters has not been known. Now, using a special imaging technique - Neutron Tomography - researchers at the Paul Scherrer Institute (PSI) have made the soot inside filters visible, creating a foundation from which these filters can be optimised and developed further.

<http://swissinnovation.org/news/web/2012/08-120711-a4.html>



Dark Galaxies Spotted for the First Time

(ETH Zurich, July 11, 2012)

Dark galaxies are small, gas-rich galaxies in the early Universe that are very inefficient at forming stars. Because they are essentially devoid of stars, these dark galaxies don't emit much light, making them very hard to detect. However, a new study of an international research team with participation of ETH Zurich marks the first time that such objects have been seen directly. The scientists searched for the fluorescent glow of the gas in dark galaxies when they are illuminated by the ultraviolet light from a nearby and very bright quasar. The team took advantage of the large collecting area and sensitivity of the Very Large Telescope (VLT), and a series of very long exposures, to detect the extremely faint fluorescent glow of the dark galaxies.

<http://swissinnovation.org/news/web/2012/08-120711-59.html>





Precise Measurement of Ultra-Short X-Ray Laser Pulses

(PSI, July 11, 2012)

X-ray lasers belong to a modern generation of light sources from which scientists in widely different disciplines expect to obtain new knowledge about the structure and function of materials at the atomic level. The scientific value of an X-ray laser stands or falls on the quality of the ultra-short X-ray pulses it produces and which researchers use to illuminate their samples. An international team led by scientists from the Paul Scherrer Institute (PSI) has now precisely measured these pulses. In so doing, they have laid the foundation for a scientifically optimal utilization of X-ray lasers – not least, of the planned SwissFEL at PSI. The results of this work have recently been published in the scientific journal Nature Communications.

<http://swissinnovation.org/news/web/2012/08-120711-da.html>

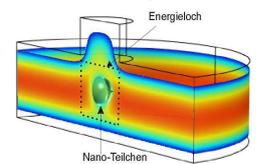


New Method Measures Charge of Nano-Particles

Biophysicists at the University of Zurich have developed a new method that measures not only the size of nano-particles but also their electrostatic charge. Up until now, it has not been possible to determine the charge of the particles directly. This unique method, which is the first of its kind in the world, is just as important for the manufacture of drugs as in basic research. Prof. Madhavi Krishnan and her co-workers measured the size and charge of the nano-particles by observing their movements in an electrostatic fluidic trap. The process has now been introduced in the Nature Nanotechnology journal.

<http://swissinnovation.org/news/web/2012/08-120730-84.html>

(UZH, July 30, 2012)



10. Economy, Social Sciences & Humanities

Socioeconomic Status and Death Risk

(UNIBE, June 25, 2012)

Researchers at the University of Bern have established a correlation between socioeconomic status and the risk of death, showing that the two are inversely correlated. Using data from the 2000 census and the Swiss National Cohort study, they generated a local socioeconomic status index. Those in the lowest index areas are forty percent more at risk than those in the highest index areas. Causes of death with most increased risk are traffic accidents, respiratory system diseases, lung cancer, and heart attacks. High index areas are concentrated around the major cities and their suburbs, and low index areas, where young people and immigrants often live, are concentrated in Alpine valleys and north of the Alps away from lakes.

<http://swissinnovation.org/news/web/2012/10-120625-38.html>

Russia Benefits from Climate Change

(ETH Zurich, July 10, 2012)

Climate change has made it easier to gain access to the Arctic for the extraction of fossil fuels. It is also opening up shipping routes that were once mostly covered by ice. In particular these include the Northern Sea Route, which shortens the trade route from Europe to Asia by around a third. As an analysis by ETH Zurich's «Center for Security Studies» (CSS) now shows, the main winner from these new realities in the Arctic is Russia. 70% of the Arctic's natural gas reserves are thought to be on Russian territory. Russia is dependent on new fossil fuel resources for further economic growth. But while other countries neighboring the Arctic have alternatives in temperate latitudes, Russia doesn't really have that option.

<http://swissinnovation.org/news/web/2012/10-120710-bb.html>



American Continent Populated in Three Waves

(UNIGE, July 11, 2012)

A researcher from University of Geneva participated in an international study using genetic testing and geographic information systems (GIS) concluded that the American continent was peopled in three successive waves. A first wave, descending mainly down the pacific coast, contributed to the establishment of the majority of Native American populations. The second wave is linked to Canada's Native population, and the third concerns the Inuit of Greenland. The study made use of innovative techniques to take into account the admixture of genes from later European and African populations.

<http://swissinnovation.org/news/web/2012/10-120711-d6.html>



11. Technology Transfer / IPR / Patents

Pre-Seed Fund venture kick Gets New Sponsor

(Debiopharm, June 20, 2012)

The Debiopharm Group will support the national Pre-Seed Fund venture kick, contributing to the development of high potential business ideas at Switzerland's institutes of higher learning and universities. Debiopharm is the first private company to join the ranks of the 5 foundations – Gebert Rüt Stiftung, ERNST GÖHNER Stiftung, OPO-Stiftung, AVINA STIFTUNG and Fondation 1796 des Associés de la Maison de banquiers privés Lombard Odier Darier Hentsch & Cie - which have all pooled their efforts in supporting the companies of tomorrow. The project is managed by the IFJ Institut für Jungunternehmen which is based in St. Gallen, Zurich and Lausanne. The objective is to double the amount of spin-offs, by speeding up the process of launching a company and by making start-ups more attractive for professional investors.

<http://swissinnovation.org/news/web/2012/11-120620-a4.html>



Software Optimizes Manufacturing Processes Economically and Ecologically

(Empa, July 03, 2012)

EcoFactory is software for companies that want to optimize their manufacturing processes not only economically, but also ecologically. It is currently being developed within the framework of a project supported by the Commission for Technology and Innovation CTI; Partners in the CTI project include Empa, ETH Zurich and the University of Applied Sciences in Berlin as well as industrial partners. The software does not just simulate financial parameters such as utilization, timing and idle times (i.e. the entire profitability aspect) but models, evaluates and optimizes process with regard to sustainability. When the project is completed at the end of 2013, the tool is going to be developed to such an extent that it can be introduced commercially.

<http://swissinnovation.org/news/web/2012/11-120703-97.html>



Japanese Company Sets Up Research Center at EPFL

(EPFL, July 20, 2012)

Nitto Denko Corporation, one of Japan's largest materials manufacturers, has announced today the establishment of a research and development unit in EPFL's Innovation Square in Lausanne, Switzerland. The "Nitto Denko Europe Technical Centre" (NET) will support the work of the R&D centers the company already has in Japan, the U.S. and Singapore and will specialize in bio based materials. With this first major Asian representative, Innovation Square confirms its attractiveness on the international level. Initially, five scientists – a number that is expected to quadruple in the next five years – will occupy the 440 square meters of the Lausanne-based center. A collaborative agreement has already been made with EPFL professor Jeffrey Hubbell (Institute of Bioengineering).

<http://swissinnovation.org/news/web/2012/11-120720-09.html>



12. General Interest

SNF Celebrates 60th Anniversary

(SNF, July 25, 2012)

On August 1, 2012, the Swiss National Science Foundation can look back on 60 years of commitment to research. The organization was founded in 1952 following concerns that Swiss research might sink into mediocrity after the Second World War. Today, the SNSF supports over 8000 outstanding researchers and is Switzerland's foremost institution in the promotion of scientific research. In its first 60 years as a research funding agency, the SNSF invested over CHF 11 billion in scientific research. During this period, it evaluated more than 70,000 applications in project and career funding and awarded fellowships for a stay abroad to more than 20,000 young scientists. Former grantees of the SNSF include Nobel Prize winners such as biophysicist Kurt Wüthrich (ETH Zurich) and biomedical scientist Rolf Zinkernagel (University of Zurich).

<http://swissinnovation.org/news/web/2012/12-120725-01.html>



13. Calls for Grants/Awards

Biggest Call for Proposals for the 7th Framework Programme for Research

(European Commission, July 09, 2012)

The European Commission has announced the final and biggest ever calls for proposals under its Seventh Framework Programme for Research (FP7). In total, €8.1 billion is available to support projects and ideas that will boost Europe's competitiveness and tackle issues such as improving human health, protecting the environment and finding new solutions to challenges arising, for example, from urbanization and managing waste. Around €2.7 billion will help cement Europe's place as a world class destination for researchers, mainly through individual grants from the European Research Council (€1.75 billion), and Marie Skłodowska-Curie Actions (€963 million) for research training and mobility. Some €1.2 billion is available for SMEs. The funding is open to organizations and businesses in all EU Member States and partner countries including Switzerland.

<http://swissinnovation.org/news/web/2012/13-120709-59.html>

Upcoming Science and Technology Related Events

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/

Disaster/risk management

Congress Center Davos, Davos

GRF Business Continuity Conference 2012 Business Continuity through Integrative Risk Management – Prepare for the Unexpected in Times of International Crisis

(IDRC Davos 2012 Post-Conference)

August 31, 2012

http://idrc.info/pages_new.php/BCM-Post-Conference/907/1/

Disaster/risk management

Global Risk Forum, 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

Medical technology

Lucerne Exhibition Center, Culture and Congress Center KKL

Luzern and the host Hotel Schweizerhof, Lucerne

Science-Switzerland Back Numbers

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

Disclaimer

The information in this newsletter is an opinion excerpt of news material from Switzerland and gathered to the best knowledge of the writer. The newsletter tries to provide information without any news preferences, and takes no claims, promises or guarantees about the accuracy, completeness, or adequacy of the information. No legal liability or responsibility can be taken. The information is provided for informational purposes only. No part of the newsletter may be used for any commercial or public use. Open disclosure of this newsletter is not permitted.