UK Science & Innovation Network

Japan Newsletter

March 2014

Contents

Editorial

I've had an incredible first year as Head of SIN Japan. From drinking sake with Nobel prize winners in Kyoto to standing meters away from a 50mph crash at Honda's R&D centre. The only disappointment has been the weather. I arrived to find the cherry blossom blown off the trees by torrential rain. My romantic visions of a snow capped Mount Fuji meant that I was ill prepared for a steaming hot tropical summer and mosquitoes in Tokyo (the hottest ever in Western Japan). Japan is a society that is used to dealing with extreme weather and natural disasters but dealing with the impact of climate change is a major challenge. Japan has some world class climate scientists (see our report below on climate science in Japan), contributing to assessments for the latest report on climate impacts by the IPCC working group in Yokohama this week.

SIN Japan team have also been busy. This month alone we supported UK missions to Japan on plant science, photonics, engineering education and composite materials, topped off by the Foreign and Commonwealth Office's Chief Scientific Adviser, Prof Robin Grimes, leading a delegation to agree civil nuclear research collaboration. Spring is also when the Japanese civil servants move to new roles so we're saying 'sayonara' under the cherry blossoms to many of our contacts and looking forward to saying 'konnichiwa' to new faces and new collaborations on research and innovation.

Elizabeth Hogben, Head of Science & Innovation Japan, British Embassy Tokyo

For more on our activities this month including the link between chocolate and photonics, what's the point of a PhD, and women in science, take a look at our Twitter feed @UKScienceJapan

Analysis: Climate Change Science in Japan

For the first time ever, the International Panel on Climate Change (IPCC) held a general meeting in Japan. From 25-29 March in Yokohama, the second IPCC working group set out the impacts that rising temperatures will have on humans, animals and ecosystems over the next century. The IPCC report, published report on 31 March, will form the basis of the international climate change negotiation. Last September in Stockholm, the first IPCC working group produced a summary on the physical science of climate change, arguing that it was real, and humans were the "dominant cause".
At the opening ceremony, Rajendra Pachauri, Chair of the IPCC, said it is critical to have tenacious adaptation and mitigation measures to reduce climate change and its impacts. This article reviews Japanese research and development focusing on measuring, mitigating and adapting to climate change.

Introduction

Japan is a modern, developed country with a society that is used to dealing with extreme weather and natural disasters. Yet the impacts of climate change will be a challenging. Japan`s average temperature varies widely from year to year, but over the long term, it has been rising at a rate of 1.15 degrees Celsius per 100 years, which is higher than the global average (0.68 degrees Celsius per 100 years). A continued increase in temperatures, rainfall depth and intensity and a decrease in snowfall are extremely likely. The impact is expected to be increased incidents of drought, heat waves, storm surges, northward expansion of flora and fauna habitats, variations in agriculture quality and habitat expansion of infectious disease bearing mosquitoes.

Climate Research

Japan Meterological Agency (JMA) is the government agency focussed on monitoring the earth's environment and forecasting natural phenomena related to the atmosphere, the oceans and the earth, as well as on conducting research and technical development in related fields. JMA issues weather/tsunami warnings and advice to government and citizens to prevent and mitigate natural disasters. JMA engages in international cooperation activities regarding both meteorology and seismology. JMA monitors and analyzes climatic conditions in Japan and around the world as well as greenhouse gas concentrations and global average surface temperatures.

The JMA Meteorological Research Institute (MRI) develops models for predicting future climate conditions and to assess the effects of global warming. The JMA has world class expertise and facilities for assessing and predicting climate change and its impacts and is a contributor to IPCC assessment reports.

Polar Research

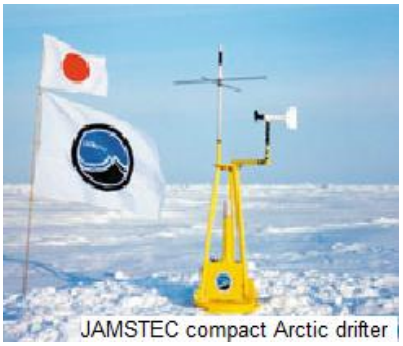
Japan has a long history of polar research. In 1910, Lieutenant Nobu Shirase led an Antarctic expedition and reached 80° south. In 1956, the first official Antarctic research expedition was formed in order to build Showa Station (right) which remains the country's main observation base in Antarctica.

The National Institute of Polar Research (NIPR) is the central research body which is mainly funded by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) with an annual budget of 38 .6 billion yen. NIPR conducts comprehensive scientific research and observations in bipolar regions by collaborating with universities and research organizations. Other key players include Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Hokkaido University, Sapporo University, Tokyo University of Marine Science and Technology, Nagoya University and Kyoto University.

Showa Station and three NIPR sub stations in Antarctica have contributed to scientific achievements such as the discovery of the ozone hole and analysis of past climate fluctuations through ice core recovery. The six-year Japanese Antarctic Research Project phase eight began in 2010 with the aim of revealing mechanism of global warming through observation of CO^2 and other greenhouse gasses, thermal structure of the Antarctic atmosphere, and inland glacial movement.

NIPR's main research base in *Arctic* regions is located in Ny-Alesund in Norway. This is a unique observation site featuring an international observation system operated by 14 institutions from 11 countries including the UK. In view of the increased importance of Arctic region as the precursor of rapidly changing global climate, the Japanese government started the Arctic Climate Change Project within the framework of the Green Network of Excellence (GRENE) in FY2011. This is a 5-year project jointly managed by NIPR and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). The project has four strategic research targets:

- Understanding the mechanism of warming amplification in the Arctic
- Understanding the Arctic system for global climate and future changes
- Evaluation of the impacts of Arctic climate on weather and climate in Japan, marine ecosystems and fisheries
- Projection of sea ice distribution and Arctic sea routes.



JAMSTEC compact Arctic drifter

Ocean Research

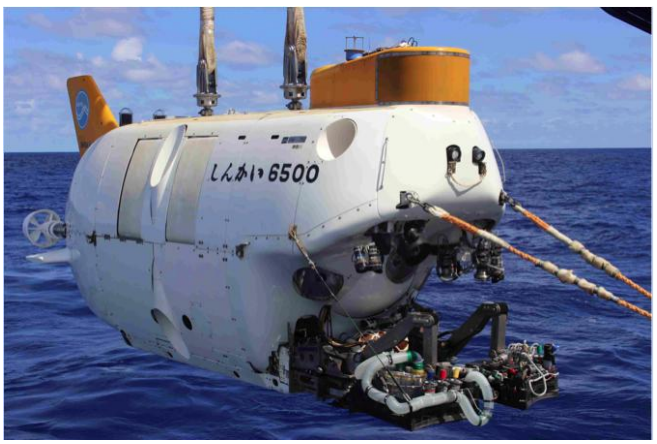
The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) is investigating the ocean's role in 'Global Environmental Changes' through a variety of research projects. JAMSTEC research was responsible for the discovery that recent major scale increases in deep-sea water temperature show that the deep oceanic water circulation around the Antarctic may be weakening.

A number of issues remain to be solved regarding the relationship between global environment changes and the oceans. JAMSTEC's aim is to create a 'super-site' for integral observation of the seas, atmosphere and ocean floor in real-time, as well as physical oceanographic, chemical, biological, and geoscientific events. In order to do this they are developing various drifting buoys, underwater gliders, and aim to cooperate with satellite and atmospheric information gathering devices.

An increasing frequency of short-term and local extreme weather phenomena have been reported including extremely hot summers or mild winters, caused solely by atmosphere-ocean interactions. If accurate prediction was available, the effects on society would be mitigated. JAMSTEC aims to develop seamless climate prediction models coupling various algorithms and high-performance computer systems. Unifying observation and numerical models continues to be the core of JAMSTEC's research into global environmental changes.

Forthcoming UK-Japan climate science collaboration:
Autonomous investigations of the Arctic`s response to changing climate

The Arctic is both influential on, and highly sensitive to, global climate change, as evidenced by the recent rapid decrease in Arctic summer sea-ice cover. Changing Arctic conditions are having unquantified effects on ocean circulation, biogeochemistry (e.g. ocean acidification), and marine ecosystems and biodiversity. Despite the importance of this region to global climate our knowledge of the role of the Arctic and the effects of climate change on the Arctic remain curtailed by its remote, inhospitable, and partially ice-covered nature. New technologies such as compact sensors, autonomous underwater vehicles (AUV) (right), gliders, and deep ocean floats, have the potential to revolutionise the ocean sciences by providing 4-dimensional information on water masses, biogeochemical cycles (e.g., carbon, nutrients), and ecosystems, and enable observations to be made in



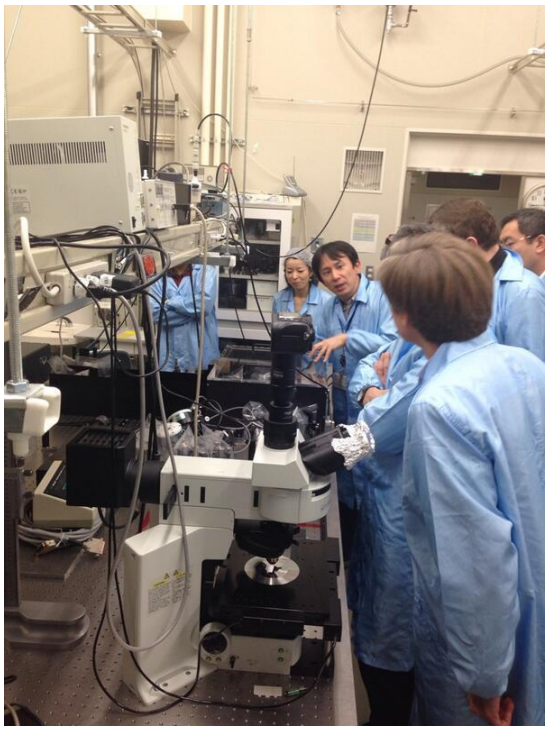
previously inaccessible regions.

SIN Japan are helping to establish a UK-Japan collaboration framework to formulate a campaign of joint oceanographic experiments to provide baseline data and measure Arctic response to climate change and other human activities. This project will target a major international science challenge that will stretch near-future autonomous technologies to provide hitherto unavailable baseline data and observations of the critically important and highly sensitive Arctic Ocean and its life.

Japanese and UK scientists have world-leading expertise in climate change, oceanography, biogeochemistry, and marine biodiversity. Japan and the UK have established pedigrees in Arctic science albeit principally from opposite sectors, the Bering Sea and North Atlantic respectively. Japan Agency for Marine-Earth Science and Technology (JAMSTEC), NOC and the University of Southampton (UoS) have cutting edge technologies in sensor development and autonomous platforms. Together with research partners such as BAS, NERC, National Institute for Polar Research (NIPR) in Japan and JAMSTEC, the British Embassy in Tokyo will host workshops in October 2014 to develop a detailed plan for a series of collaborative oceanographic experiments in the Arctic.

SIN Japan Activities

Photonics and Metamaterials Mission



Eight of Britain's top photonics and metamaterials researchers, led by Prof Nikolay Zheludev of Southampton University, spent a week in Japan from 10-14 March, in a programme funded by SIN Japan and co-organised by Osaka University. The week included a two-day workshop in which the UK visitors and eight leading Japanese researchers presented some of their latest research. This included a series of visits to leading photonics laboratories in the Tokyo area, a day at Osaka University, and a Science Cafe event hosted by science publisher Nature Asia.

Photonics, the science of light, has myriad applications from laser eye surgery to telecommunications to metrology to robotics.

The mission uncovered plenty of potential areas for UK-Japan collaboration, including in quantum physics where the UK government recently committed £270m to maintain the UK's lead in related technologies. SIN

Japan is working with the mission members and EPSRC on follow-up activity. Contact science.tokyo@fco.gov.uk for more information.

Establishment of the UK Japan Collaborative Civil Nuclear Research Programme

Just over three years have passed since the March 2011 earthquake and tsunami. The UK and Japan have since been working closely to share expertise and knowledge of nuclear issues to resolve the situation in Fukushima. Cooperation has been strong in areas including support for regulatory reform, risk communication, stakeholder dialogue, assistance of mechanisms/engineering related to decommissioning and R&D. Furthermore, the annual UK-Japan Nuclear Dialogue, held in Oct 2013, confirmed that the R&D relationship will be boosted in the coming year.

The Foreign and Commonwealth Office's Chief Scientific Adviser (CSA), Professor Robin Grimes, visited Japan with members of UK academia and EPSRC in late March 2014, to finalise discussions for the establishment of the "UK Japan Collaborative Civil Nuclear Research Programme". This programme marks a step-change in the bilateral research relationship, beginning as a co-funded programme between EPSRC and the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). The first round of calls, expected in May 2014, will look into "Severe Accident Research" and "Environmental Safety", especially those researchers with links to Japanese counterparts.

Keep an eye out on the EPSRC website for details. If you have good ideas but not enough links with Japanese partners, let the SIN Japan team know and we'll do what we can to support.

UK-Japan National Composite Centres MOU

The Directors of the National Composites Centres (NCCs) of Japan and the UK signed a memorandum of understanding in Nagoya on 24 March 2014, aiming to work together on the challenges of developing advanced composite materials. Use of carbon-fibre composites worldwide is increasing rapidly, particularly in the aerospace and automotive industries, thanks to the materials' high strength and light weight, together with falling costs; but they remain expensive for more widespread application.

UK NCC Chief Executive Prof Peter Chivers, signed the MOU with Prof Takashi Ishikawa, Director of Japan's NCC. The UK visitors toured the Nagoya facility before visiting the Kawasaki Heavy Industry (KHI) state-of-the-art Nagoya plant to see the manufacture of 787 Dreamliner all-carbon-fibre fuselage sections. The plant incorporates the world's largest autoclave. Having 9-metre diameter enables it to heat- and pressure-treat entire fuselage sections before they are loaded into giant transport aircraft and flown to the USA for final assembly of the airliners.

The industrial tour then moved on to Carbon Fibre Recycling Ltd, a venture company trying to commercialise their experimental process for separating carbon fibre from the resin matrix so it can be re-used. The visitors also saw Toyota's composite Lexus LFA car and visited Toray, the world's top maker of carbon fibres, before spending a day at Japan's number-two ranked Kyoto University, with which Bristol University (where the UK NCC is based) has a wide-ranging relationship.

In the coming weeks NCC UK and SIN Japan will be exploring collaborative opportunities springing from the MOU and visit. Please contact science.tokyo@fco.gov.uk if you are interested in getting involved.

UK-Japan Plant Science Workshop- the roots to success

SIN Japan organised a UK-Japan Plant Science Workshop on 5-6 March 2014 which brought together numerous prominent plant scientists from the UK and across Japan to discuss the importance of plant sciences today and in the future. The workshops, organised with support from RIKEN Yokohama, chose the topic of “Rhizosphere interactions” (the interactions between plants, soil and microbes) as the focus.

A broad spectrum of topics were discussed, ranging from plant pathology to plant development to nutrient acquisition. Furthermore, methods and techniques discussed ranged from molecular techniques to computational modelling. In all cases, both UK and Japanese participants highlighted the importance of plant science research for food security as well as the need to employ various biological and mathematical techniques to help solve underlying questions.

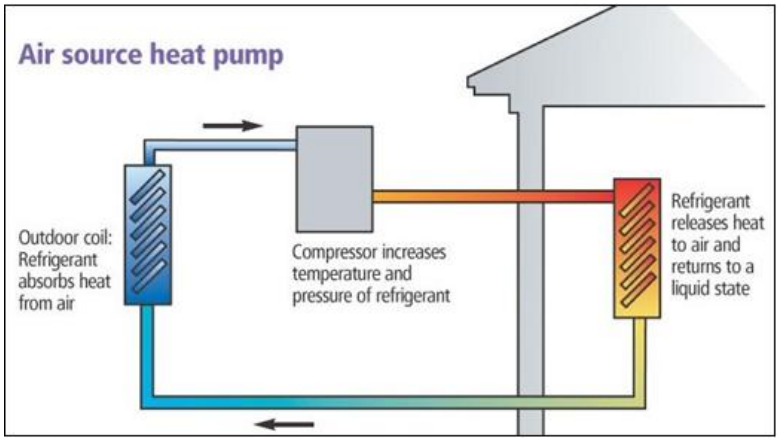
It was agreed that Japan’s current strengths lie in chemical synthesis, biochemistry and the presence of numerous state-of-the-art facilities whilst the UK’s strengths lie in mathematical and computational modelling in plant research. Researcher visits to the UK are being planned to help share expertise and build research collaboration in these areas.

Multimillion pound deal to bring down fuel bills

On 12 March 2014 a memorandum of understanding (MOU) on energy collaboration between UK-Japan, was signed by Minister Gregory Barker and Japan’s New Energy and industrial technology Development Organisation (NEDO) in Japan. It was agreed to conduct a £20+ million smart community demonstration project in Manchester leveraging Japan's heat pump technology and information and Communication technology (ICT).

The project aims to install 600 next generation air source heat pumps into council-owned homes in Greater Manchester, linked via a ‘smart network IT platform’ to enable advanced management of energy flows. This builds on a UKTI/SIN Japan project on Smart Grids Feb-Mar 2012, leading to an agreement to conduct feasibility studies, which have now progressed into the full scale demonstration of the technology.

NEDO Chairman Furukawa, at the MOU signing ceremony at the Houses of Parliament in Westminster, stated that this project will allow better understanding the impact of the technology at scale and could play a significant role in making a shift to low carbon energy sources. It will also contribute to the advancement of economic and technological exchange between Japan and England through the dissemination of the state-of-the-art smart technology.



More details available here:
http://www.agma.gov.uk/latest-news/multi-million-pound-deal-to-bring-down-fuel-bills/index.html

Japan-UK Nanotechnology Frontiers

On 10-12 March JAIST International School held a programme of eight lectures on the frontiers of nano-science and technology. Speakers included researchers from JAIST and distinguished UK universities: University College London (UCL), University of Southampton (SOU) and Imperial College London (ICL). The aim was help further understanding about cutting-edge nanotechnology and to introduce undergraduate or Master's course students to Collaborative Education and Co-supervision Programmes between JAIST and UCL, JAIST and SOU.

Under these programmes, both JAIST and UCL faculty members work together for doctoral training and research supervision of selected candidates over a three-year period. In the second year of this programme, the students are sent to the partner institution and supervisors of the partner institution directly provide the students with research training for one full calendar year in total. Currently, three research programmes in the field of nano-particle science have been chosen as collaborative research projects. Two students (one from JAIST and one from UCL) from each programme are participating, and the first students will arrive at JAIST in October 2014.

Elizabeth Hogben, Head of SIN Japan, spoke at the event; "Schemes like the collaborative Education and Co-supervision Programmes between JAIST and UCL, JAIST and SOU are blazing a trail to promote academic exchanges including research collaboration with UK. This kind of close partnership does not just

mean a word class experience for the student. The relationships developed through this approach should give an excellent foundation for research collaboration into the future."

Other News

World's first performance database engine for Big Data analysis

The University of Tokyo and Hitachi jointly announced the World's First Performance Record for the Largest-Scale Class in the Industry-Standard TPC-H Database Benchmark test result in its largest-scale 100 TB class.

The development of this database was inspired by the achievement of ultrafast database engine technology following the "out-of-order execution principle". This database achieved an excellent performance result of 82,678.0QphH@100 TB, and became the first product to be recorded in the performance result list for the 100 TB class.

This research project was conducted jointly by Professor Masaru Kitsuregawa, The University of Tokyo and Hitachi and was supported by the Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST Project) from March 2010 to March 2014.

In November 2009, Japanese government allocated ¥100 billion to the FIRST Program. The aim of the FIRST Program is to advance strategic leading-edge research in wide spectrum of fields from basic research to R&D topics and development that will strengthen Japan's international competitiveness while contributing to society of its results. The government selected the top 30 researchers with the highest potential projects from various fields with a research fund ranging from ¥1.5 to ¥6 billion over a period of 5 years.

More details available here: http://first-pg.jp/english/en-about-us/kitsuregawa-masaru.html

Japan considering measures against PM2.5 pollution

The Japanese government has decided to collect data about hazardous PM2.5 particulate emissions and compile an interim report by January 2015 on measures to reduce such emissions. The decision came at the first meeting of the Central Environment Council subcommittee on the hazardous particulate measuring 2.5 microns or less. A report given at the meeting said diesel vehicle restrictions and other initiatives have cut direct PM2.5 emissions from vehicles and other sources in Japan, while no measures have been taken against pollutants that transform into PM2.5 through chemical reaction.

Sendai plant reactors may take lead in safety review process

The Nuclear Regulation Authority is expected to gear up the safety review for two reactors at the Sendai plant in south-western Japan, with regulators raising no strong objections to the plant operator's arguments on earthquake and tsunami risks.

Speculation has been growing that the Nos. 1 and 2 units at the Kyushu Electric Power Co.'s Sendai plant in Kagoshima Prefecture could become the first to finish the safety review process toward restarting among Japan's 48 commercial reactors that remain offline.

The Sendai plant is one of the five nuclear power stations for which applications for safety checks were submitted to the NRA on July 8 last year, the day when a set of new safety requirements were introduced in the wake of the March 2011 Fukushima Daiichi nuclear power plant disaster.

Symposium on marine energy held at the British Embassy

On 24 March, a symposium to promote marine energy development in UK and Japan was held at the Embassy. Government energy officials and academics attended the event to discuss renewable energy opportunities in the sea. Akiyasu Isaki from the Cabinet Secretariat explained 'While nuclear use plan is not clear, it is impossible to come up with the renewable energy target. But marine energy has a high potential within harbours.'

MEXT – putting pressure on research institutions by cutting funds if fraud is found

Following a long series of accusations regarding the clinical data for Valsartan by Novartis, MEXT has decided to clarify the management responsibility of research institutions by revising its guidelines for research misconduct. Starting this April, research institutions will be required to appoint a person in charge of misconducts and ethics education within their institution. In case issues are not properly dealt with, there will be a maximum penalty of a 15% cut in research expenses.

Japan launches satellite to monitor global rainfall

A Japanese rocket carrying a satellite developed by the U.S. and Japanese space agencies for monitoring precipitation worldwide was successfully launched early Friday morning, the Japan Aerospace Exploration Agency said. The H-2A launch vehicle No. 23 was lifted off from Tanegashima Space Centre in Kagoshima Prefecture at 3:37 a.m. and detached the satellite, called the Global Precipitation Measurement core observatory, roughly 16 minutes later.

The GPM satellite is a joint work of JAXA and NASA for forecasting abnormal weather conditions such as deluge and drought by monitoring rain clouds and precipitation. The 6.5-meter high, 4-ton machine is programmed to orbit at an altitude of 400 kilometres.

Gov't laboratory mulls retracting groundbreaking stem cell paper

Questions have been raised about images used in a ground-breaking stem cell paper, written by a group led by Haruko Obokata at the Riken Center for Developmental Biology, on a method the group named "stimulus-triggered acquisition of pluripotency" or STAP.

The institute and the publisher are both investigating the paper in order to decide whether retraction is necessary.

Riken to establish its first industry-academia R&D base in Kobe

Riken will be establishing its first industry-academia research base in Kobe. Joint research on drug discovery and application of regenerative medicine will be done together with researchers from Riken, pharmaceutical companies and universities. The project, worth 3.8 BJPY, will utilise results of basic research for commercialisation.

The base will be called "fusion, cooperation and innovation promotion building" (literal translation).

Construction will start this March and is scheduled to end before April next year, when projects are expected to start.

Calls for research themes and partners will be released this March to Riken researchers and companies. In basic principle, only joint teams between Riken and companies are accepted (company-company teams are not accepted), but this may be revised in the future. Companies from pharmaceutical giants to medical equipment ventures are expected to join.

Lessons from 2011 quake must be put to use for Japan and the world

On March 11, Tokyo paid tribute to the memory of those who died in the 2011 catastrophe. The government memorial event was attended by about 1,200 people, including the Emperor and Empress and Prime Minister Shinzo Abe, along with representatives of the victims' families and foreign ambassadors to Japan.

The Prime Minister reiterated his determination to see a set of measures implemented to render Japan disaster-ready and disaster-resistant. "I take to heart the valuable lessons learned from the ordeal, and I will promote efforts to build a country that can resist and withstand damage from disasters in order to steadfastly defend our people from future disasters. The hurdles are high and numerous. They include making seismic retrofits of existing buildings to make them more quake-resistant and revamping outdated infrastructure. There is also an urgent need to prepare in earnest for disasters that have been forecast, including a quake centred below Tokyo or a quake in the Nankai Trough."

Research Funding Opportunities

International Research in Security (IRIS)

Issue date: 11 March 2014. Closing date: 28 August 2014.

EPSRC is inviting proposals from UK academics for projects which will support visiting Fellows from India, Israel or Japan to carry out cyber security research in, and build collaborative links with, the UK. Proposals are welcome in any area of research directly relevant to cyber security, including less well-represented domains such as the social, economic and mathematical sciences.

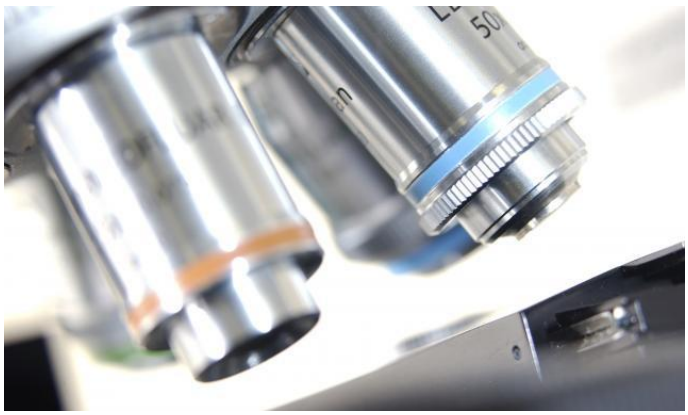
More information here: http://www.epsrc.ac.uk/funding/calls/2014/Pages/iris.aspx

Forthcoming Events

Astellas Pharma: Business & Opportunity Webinar, 3 April 2014

UKTI Japan's Life Sciences team are delighted to announce a webinar session by Astellas Pharma Inc, Japan's second largest research based pharmaceutical company. Astellas Pharma Inc aims to become a world leader by providing high value products worldwide, in specialised areas where there is a high level of unmet medical need. The company has already established a strong presence in the areas of Urology and Immunology (including Transplantation) and infectious diseases, and aims to develop in the field of oncology. Astellas has formed a number of business partnerships in recent years.

During the Webinar, the guest speaker, Mr Chihiro Yokota, Global Head of Business Development, will explain Astellas' business and partnering strategies and areas for potential collaboration with UK companies.



Registration is free and you can watch online from your computer anywhere.

More info here: http://www.exporttojapan.co.uk/event/astellas-pharma-business-and-opportunity-webinar

SIN Japan Contacts

Elizabeth Hogben	Head of Section		+81 (0)3 5211 1322
Simon Fisher	Western Japan		+81 (0)6 6120 5621
Yumiko Myoken	Climate Change, Environment and Life Sciences		+81 (0)3 5211 1328
Seiichi Asano	ICT, Engineering and Physical Sciences		+81 (0)3 5211 1327
Tokyo	**General Enquiries**	Science.Tokyo@fco.gov.uk	+81 (0)3 5211 1321
Osaka	**General Enquiries**	Science.Osaka@fco.gov.uk	+81(0)6 6120 5621/3

To subscribe to this newsletter email: science.tokyo@fco.gov.uk, or science.osaka@fco.gov.uk

Visit our web site https://www.gov.uk/government/priority/uk-science-and-innovation-network-working-with-japan

Exchange rate used for conversion: GBP 1 = JPY 160