PAUL SCHERRER INSTITUT

PSI facilities newsletter

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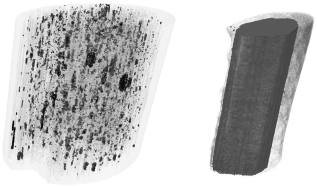
Announcement

Appointment of the New SYN Department Head

Professor Gabriel Aeppli will become the new head of the SYN department as of April 2014. Gabriel Aeppli is an internationally recognized solid-state physicist with a broad interest. He is especially known for his spectroscopic work on magnetism of disordered systems and high-temperature superconductors, with a strong focus on neutron and photon diffraction studies as well as scanning tunneling spectroscopy. With the London Centre for Nanotechnology, he has built in a short time a leading science and technology center in the heart of London. http://www.psi.ch/sls/

Research highlights



Unique insight into carbon fibers on the nanoscale

A. Diaz et al, Carbon (2013), Article in Press, DOI: j.carbon.2013.09.066

Novel carbon materials are promising candidates for light and robust low-cost materials of the future. Understanding their mechanical properties benefits from highly resolved three-dimensional (3D) maps of their porosity and density fluctuations in uninterrupted "representative" volumes, but these are difficult to obtain with conventional imaging methods. Scientists at the Paul Scherrer Institut have now succeeded to produce in collaboration with Honda R&D in Germany highly resolved 3D density maps of entire sections of carbon fibers. The technique they used, called ptychographic computed tomography, offers unprecedented insights into the nanomorphology of these materials. Without the need of sectioning the fibers, their porosity can be visualized in 3D as can high-density carbon regions attributed to different degrees of graphitization, indicative of atomic structure differences in the material. Such imaging capabilities are expected to prove useful for the systematic study of the mechanical properties of carbon fibers, addressing a crucial point when designing and tailoring novel carbon materials. http://www.psi.ch/sls/scientific-highlights.

Installation of SwissFEL undulator prototype in the injector test facility.

Romain Ganter

On December 5th, the 17 tons SwissFEL undulator prototype (In-vacuum Undulator U15) has been successfully moved from the Undulator lab (SLS) to the SwissFEL Injector Test Facility (SITF). The commissioning of the U15 prototype with electron beam is an important step to validate the U15 design and also to detect possible improvements before full series production. At first, the alignment procedure of the U15 segment with the electron beam will be tested. Later, twelve such U15 segments will have to be precisely aligned on a straight line in SwissFEL. Another important step at SITF, will be the detection of free electron laser amplification at 70 nm. Indeed, simulations have shown that with the electron beam parameters within reach at SITF, it should be possible to see the beginning of the SASE (self-amplified spontaneous emission) amplification.