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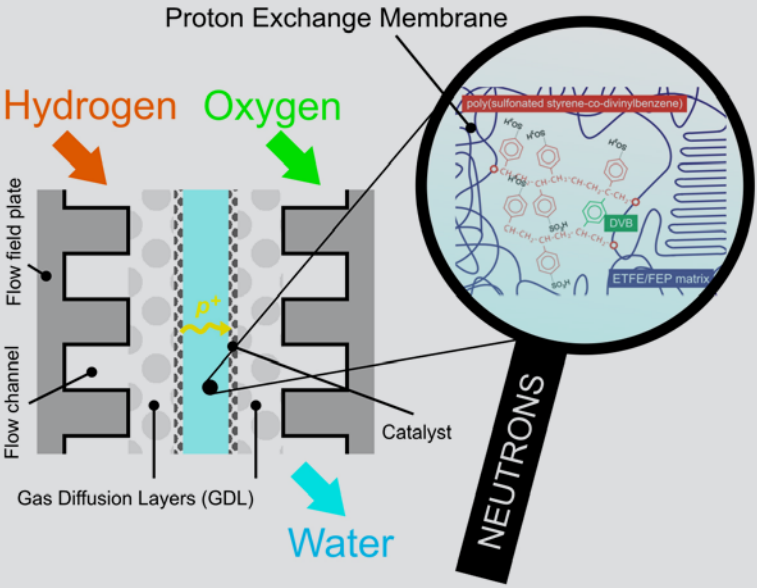

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Société Suisse pour la Diffusion des Neutrons
Swiss Neutron Scattering Society

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ON THE COVER:

Artists view of a polymer electrolyte fuel cell studied by small-angle neutron scattering, see related article by S. Balog et al.

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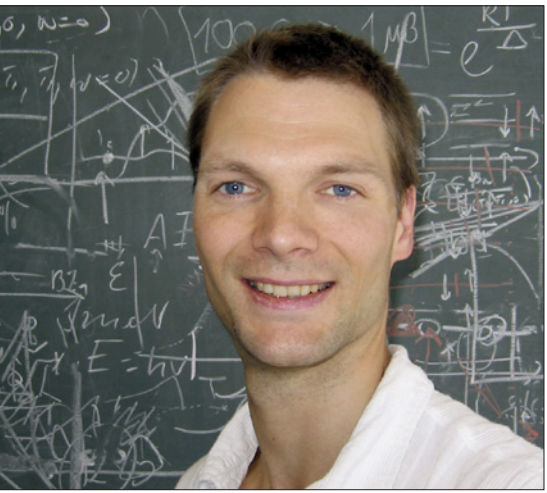

DEAR MEMBERS

Happy new year – wishing that 2011 will bring us all exciting times, beautiful data and new discoveries!

An exciting time it is indeed. A record number of proposals to our national neutron source SINQ testify the quality and competitiveness of its instrumentation; the strong national activities; and the international recognition and utilization. The progress of the ESS project brings excitement for the future of European neutron scattering and the worldwide perspectives broaden with on-going development of SNS in the US (neutrons.ornl.gov/), JPARC in Japan (j-parc.jp/MatLife/en/index.html) and new international sources such as the China Advanced Research Reactor CARR in Beijing (www.ciae.ac.cn/eng/carr/index.htm), which I had the pleasure to visit in 2010, and the push for a China Spallation Neutron Source (csns.ihep.ac.cn/english/index.htm).

However, there are also challenges up the road. For instance the funding situation in the UK is still uncertain, which strongly affects the ISIS facility. Latest information is that they have funding for 120 days of operation in 2011. For a facility capable of operating 180–200 days/year, this is a dramatic loss in productivity for a marginal cost saving. The instrument suite at any of our facilities, ISIS not the least, is unique. And therefore a loss of access time affects the entire neutron community. It is therefore important that the European wide community supports the individual national sources. At our latest ENSA meeting it was decided that ENSA as the voice of the European neutron scattering community would formulate a letter of support aiming to help ISIS obtain sufficient funding to maintain optimum productivity-per-cost operation. Likewise, ENSA formulates support for the Triga reactor in Vienna (http://www.ati.ac.at/), which albeit being a small facility has unique activities in particular in the field

on fundamental quantum physics with neutrons. If you have issues – national or European – that you feel could be tackled in ENSA, please let us know.

Concerning ESS, Swiss contributions are already underway with PSI leveraging its expertise in target-choice and -optimization as well as beam-extraction. In this context, discussions of a Swiss-Danish collaboration concerning ESS instrumentation have been initiated. Building on the already existing Swiss-Danish collaboration at SINQ and the overlap in scientific focal points in the two countries (large activities in both Magnetism and Soft condensed matter), such a collaboration could be an ideal entry point to scientific engagement at ESS with obvious synergic benefit to our SINQ facility. In this context, the Swiss Neutron Scattering Society wishes in the coming months to inquire our community about which specific instrument types and capabilities are particularly desired at the ESS.

In addition to the Swiss ILL PhD student, the call for which was announced at the General Assembly last year, I would like to remind you that ILL also has a direct call for PhD students with deadline 23rd of March (http://www.ill.eu/science-technology/phd-students/phd-recruitment/). With my own ILL PhD student Martin Mourigal soon finishing his thesis after a very fruitful experience, I can highly recommend such studentships as an excellent way to develop close collaborations with ILL, which remains a very important asset for the Swiss neutron community.

Finally, it is a great pleasure for me to welcome the new head of Laboratory for Neutron Scattering at PSI – Christian Rüegg. During our overlapping time at PSI, we spent many productive hours together on the instruments and in the office building of LNS. Since then Christian has developed into a leader in his field, and it is a great asset for the Swiss community to have him back.

Henrik M. Ronnow

Neutrons for Fuel Cells

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1. INTRODUCTION

Sustainable energy technologies require clean and renewable primary energy sources as well as efficient energy conversion devices. Fuel cells offer a method of conversion of chemical to electrical energy that has high efficiency and yields low emission. Therefore, interest in fuel cells has tremendously grown over the past years. The polymer electrolyte fuel cell (PEFC) is particularly attractive for portable applications and automotive propulsion.

When hydrogen and oxygen are used as reactants in the PEFC, the half-cell reactions taking place at the anode and cathode are $H_2 \rightarrow 2H^+ + 2e^-$ and $½\ O_2 + 2H^+ + 2e^- \rightarrow H_2O$, respectively. The main function of the electrolyte, frequently referred to as the proton exchange membrane, is to transport protons generated at the fuel electrode (anode) to the oxygen electrode (cathode). It also acts as a separator between the anode and the cathode by preventing the direct reaction of fuel and oxidant. The overall reaction yields water and heat as the only byproducts. The voltage of a single cell is typically around 1.0 V in the absence of a load, and around 0.7 V at the designed operating point for power output.

In the PEFC water plays a double and crucial role: the electrolyte membrane needs sufficient humidification in order to fulfill its function as a proton conductor, but accumulations of liquid water can be detrimental as they can hinder the transport of oxygen by diffusion in porous materials. These accumulations can also induce an unbalanced distribution of gas flow which may negatively affect the cell performance, stability, and durability. Therefore, the understanding of water transport in PEFCs and its effect on fuel cell performance is of high importance. Imaging with neutrons is very attractive in

fuel cell research because fuel cell construction materials such as aluminum, graphite, and steel are transparent for neutrons when compared to water, providing a high contrast. Thus, the distribution of water can be studied in an operating fuel cell, with no or very little modifications compared to usual designs. A great asset of neutron imaging is the sensitivity to different isotopes of the same chemical element, in particular, ^{1}H and ^{2}H. This allows performing labeling experiments where the dynamics of water transport can be studied. In the first part of this paper we present how the technique of neutron imaging, performed at the ICON [1] beam line of the SINQ spallation source [2] at Paul Scherrer Institut (PSI), contributed to the understanding of water transport in PEFCs.

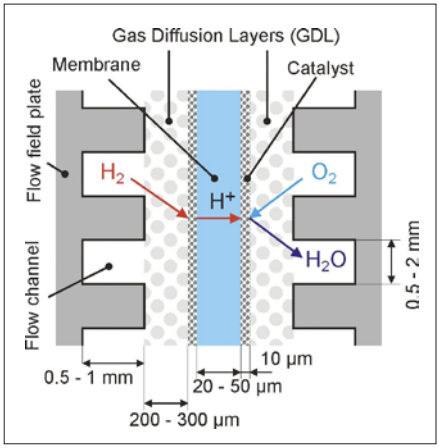

Figure 1: Structure of a PEFC – not to scale.

2. NEUTRON IMAGING

The most common imaging configuration for fuel cells is the so called through-plane imaging, where the neutron beam axis is perpendicular to the membrane. This configuration allows imaging of the water distribution over a large area, but does not permit a distinction between the different layers of the cell. In recent times, this issue has been addressed by developing in-plane imaging, where the neutron beam axis is parallel to the cell membrane. This imaging configuration requires higher resolution, as the typical thickness of a fuel cell gas diffusion layer (GDL) – the layer through which the oxygen has to diffuse to the reaction area – is approximately 200 µm (c.f. Figure 1). Imaging of fuel cells has been a strong driving force for the improvement of the spatial resolution in neutron imaging during the past years. At PSI, effective spatial resolutions down to 10 µm could be achieved [3, 4]. The typical setups for fuel cell imaging use a slightly lower resolution (~20 µm), in order to achieve low exposure times of 10s and permit the observation of transient phenomena. Two examples hereunder will illustrate the possibilities of high resolution imaging.

2.1 Dynamic imaging of water in porous media

Important information can be obtained from the observation of transient water distribution following a change in operating conditions. In the example presented here, the gas fed to the cell was changed from high humidity (90% RH on both sides) to low humidity (40%

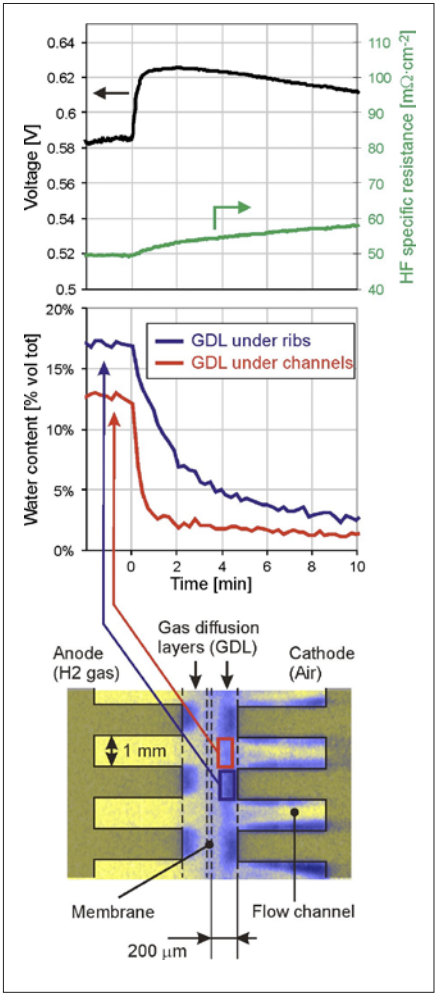

Figure 2: Temporal evolution of cell performance and water content in porous media following a change of relative humidity.

and 0% RH on anode, resp. cathode side), while continuously operating the cell. As observed in the graph in Figure 2, the amount of water in the cathode side GDL is reduced to almost zero after this change. Water located directly under the flow channels (red region) disappears quickly while the region under the ribs separating the flow channels (blue region) take a longer time to dry. A step in the cell voltage, synchronous to the removal of water in the region under the flow channels, indicates that water accumulation in this region is responsible for the corresponding loss of cell performance. On a longer time scale, the membrane dries out, as illustrated by the increase in the measured resistance. This relates again to a loss in cell performance. We can thus observe that there is a transient state where the most critical region is free of liquid water, while the membrane has not dried out yet.

2.2 Use of ^{1}H-^{2}H contrast imaging

As mentioned previously, neutron imaging is an isotope sensitive method. In particular, the total interaction cross section of neutrons with water (H_2O) and heavy water (D_2O) differ by approximately one order of magnitude. The use of isotopes allows the study of membrane characteristics related to water transport, such as the self-diffusion coefficient of protons in the membrane. In the example presented in Figure 3, the time resolved profile of ^{1}H isotope fraction in a thick membrane was measured after a change of gas humidification from heavy water (^{1}H isotope fraction = 0) to normal water (^{1}H isotope fraction = 1). The experiment was realized on a non operating cell with one side sealed with PTFE in order to produce a well defined border condition

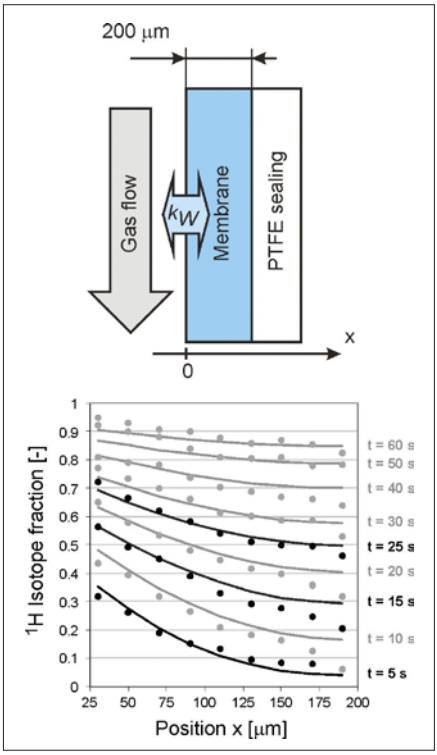

Figure 3: Comparison of experimentally measured ^{1}H isotope fractions (dots) and calculated values based on the best fit of parameters D and k_W.

on that side. The experimental results were compared with a simple 1D model, taking into account the characteristics of the diffusive transport in the membrane (quantified by the self-diffusion coefficient D) and a finite interfacial exchange rate k_W between the water vapor and the membrane. Both parameters D and k_W were evaluated based on the best fit to the experimental data. For the tested samples, a value of approximately $1 \cdot 10^{-5}$ $cm^2 \cdot s^{-1}$ was estimated for D, which is of the same order of magnitude as the value reported in the literature based on nuclear magnetic resonance (NMR) measurements [5, 6]. The values for the interfacial exchange rate kW were estimated to be in the range from $1 \cdot 10^{-5}$ to $3 \cdot 10^{-5}$ $mol \cdot cm^{-2} \cdot s^{-1}$. Such values are of the same order of magnitude as the flows of water involved in PEFC operation, which suggests that usual representations of the membrane assuming equilibrium between the membrane border and the adjacent gas phase – and implicitly an infinite exchange rate – might not be appropriate.

3. SMALL-ANGLE NEUTRON SCATTERING

In this part we shall focus on the nano-scale morphology of proton exchange membranes synthesized at PSI [7]. The proton exchange membrane is a thin polymer membrane, which has to satisfy several functional requirements: electric insulation coupled with proton conductivity of the order of 0.1 S/cm, separation of the reactant gases, mechanical integrity, as well as chemical and thermal stability [8]. Finally, the proton exchange membrane should be affordable and durable because major factors limiting widespread commercialization are the cost and the lifetime. Since a pure homopolymer itself is not able to ensure all the functional requirements, the functionalities are decoupled by applying copolymers. Graft copolymers represent a versatile class of macromolecules where different and immiscible polymer constituents may be combined [9, 10]. Fluorocarbon based polymers,

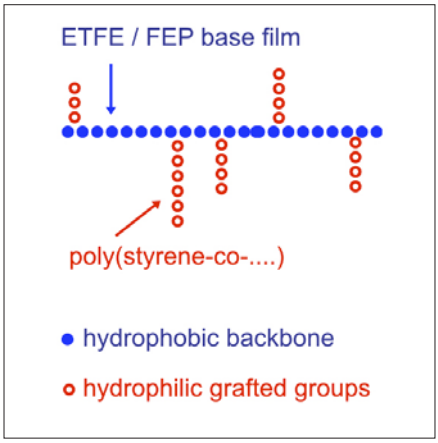

Figure 4: Schematic topology of a grafted copolymer electrolyte synthesized at the Electrochemistry Laboratory of PSI.

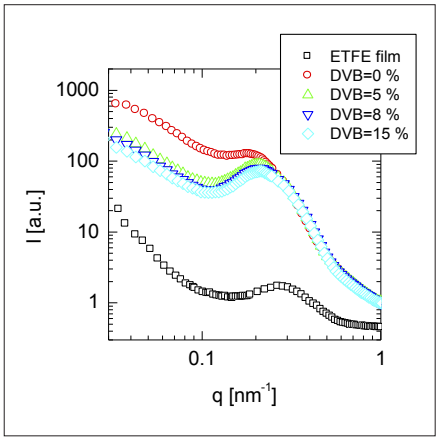

Figure 6: The azimuthally averaged scattering intensity of the ETFE base film and the dry membranes at different cross-link levels [14].

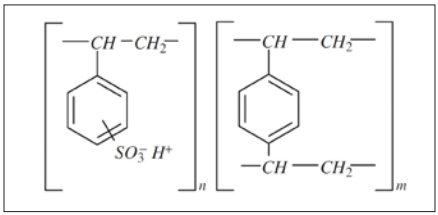

Figure 5: The molecular structure of poly (sulfonated styrene-co-DVB).

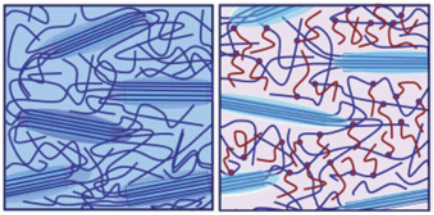

Figure 7: Illustration of the amorphous-crystalline domain structure in the semi-crystalline base polymer (left) and in the membrane [15]. The polystyrene (red) is grafted into the amorphous phase of the base film (blue chains).

such as ETFE and FEP (poly(ethylene-alt-tetrafluoroethylene) and perfluorinated poly(ethylene-propylene), respectively) are used as matrix due to their strong carbon-fluorine bonds, which results in good resistance to solvents, acids, bases, and heat as well. The growth of pendant chains onto the base polymer's fluorocarbon backbone can be achieved by, for example, pre-irradiation-induced grafting [7]. The pendant chains are generally formed by polystyrene because styrene can be easily sulfonated, which introduces the ionic content necessary for proton transport (Figure 4).

To further improve membrane properties, one may also graft a carefully selected second co-monomer along with the styrene. In particular, the use of cross-linking monomers, e.g. divinylbenzene (DVB), can substantially improve the stability of the membrane (Figure 5).

Due to sulfonation, the grafted phase of the membrane becomes partially hydrophilic and is able to swell in water. In the presence of water, the sulfonic groups dissociate and free excess protons are released: $SO_3^-H^+ + H_2O \rightarrow SO_3^- + p^+ + H_2O$. Since water is an excellent proton conductor, these excess protons become mobile and undergo diffusive motion [11]. Upon a sufficient level of hydration, a percolated aqueous phase forms and ensures proton transport from the anode to the cathode. The volume fraction of the aqueous phase has an elementary control on the membrane's conductivity. A hydrous phase that is highly connected and abundant in mobile protons is a requisite for good proton conductivity. Because the ETFE (FEP) base polymer is semi-crystalline and hydrophobic, the morphology of the proton exchange membrane is not trivial. The simultaneous presence of hydrophobic and hydrophilic domains results in a phase separated domain structure, and its properties can be obtained from SANS measurements. The morphology of the hydrated membrane can be studied by contrast-variation, which allows to enhance the scattering from the different phases, by systematically varying the mixing ratio of the heavy- and light-water in the aqueous phase of the membrane. This is a fundamental technique yielding information about the number and morphology of existing phases in water swollen membranes.

Here we explain how SANS was applied to characterize the morphology of ETFE and FEP based membranes grafted with poly(sulfonated styrene-co-DVB). These studies were carried out at the SANS-II [12] beam line of the SINQ spallation source [2] and at the NG3 beam line of the National Institute of Standards and Technology (NIST, U.S. Department of Commerce) [13].

3.1 ETFE based dry membranes

The small-angle scattering pattern of the ETFE base film is dominated by a broad correlation peak, and an upturn below 0.1 nm^{-1} is also present (Figure 6). The ETFE film is semicrystalline with a crystalline content of approximately 35%. Therefore, we identify the correlation peak as the so-called crystalline domain peak, indicating a characteristic length (~22 nm) defined by the alternation of the amorphous and crystalline domains (Figure 7). The scattering spectra of the dry membranes display the attributes of the ETFE film, however, the scattering intensity is almost two orders of magnitude higher due to the increased contrast between the ETFE and poly(sulfonated styrene-co-DVB). Furthermore, the center of the correlation peak shifts to lower q-position, because the amorphous ETFE phase swells upon accommodating the grafted poly(sulfonated styrene-co-DVB) copolymer, which increases the characteristic length in the morphology. The swelling is at

a maximum without cross-links and gradually decreases with increasing cross-link DVB level.

3.2 ETFE based hydrated membranes

The SANS spectra of water-saturated membranes are shown in Figure 9. Upon water uptake the position of the correlation peak, q_c, shifts towards even smaller q-values (Figure 8). The difference in the characteristic length in the dry and swollen state decreases with increasing cross-link level. The correlation peak of the membrane without cross-linker nearly disappears upon hydration, while the peaks are well preserved for cross-linked membranes. Upon water uptake, the amorphous domains swell even further. The swelling is at maximum without cross-linking and it decreases with increasing cross-link level, as shown in Figure 8. This is in clear correlation with the volume fraction of water in the membrane, which decreases with increasing DVB level, affecting the conductivity (Figure 8). Varying the contrast for the membrane synthesized without cross-linking affects mainly the magnitude of the scattering spectra. This indicates scattering from a biphasic morphology, where the phase-separated domains are either aqueous or water-free. On the other hand, for cross-linked membranes the steepness of the low-angle intensity upturn apparently depends on the ratio of deuterated- and normal water. This implies scattering from more than two phases. Beside the anhydrous phase and the well hydrated

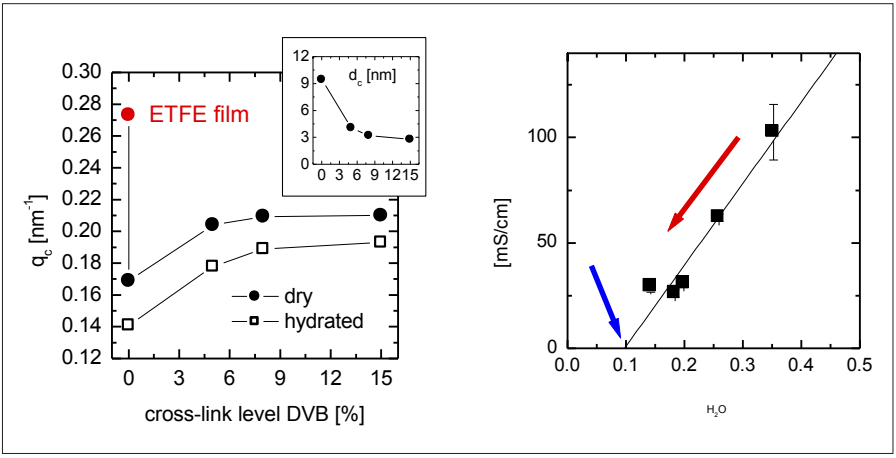

Figure 8: Left: The center of the correlation peaks as a function of the cross-link level in the dry and the hydrated membranes. The inset displays the swelling in nanometers d_c due to hydration also as a function of the cross-link level DVB. Right: The proton conductivity versus the water volume fraction in the membranes. The red arrow indicates the increasing cross-link level. A threshold, marked by the blue arrow at ~10% volume fraction of water in the membrane, indicates the onset of percolation.

phase, most likely there is a weakly hydrated phase. This phase may be poorly grafted or may have a higher density of cross-linking, which locally hinders water swelling.

4. FEP BASED MEMBRANES

Fuel-cell membranes based on FEP were synthesized with systematically varied graft level with and without DVB cross-linker. Figure 10 displays the scattering spectra of cross-linked membranes synthesized with gradually increasing graft level.

Upon grafting, the styrene swells the amorphous domains. When the graft level is increased from 0 up to 15%, a regular increase is exhibited in both the characteristic length and the scattering intensity (Figure 11). However, when the level of grafting is above 15%, both the intensity and the characteristic length remain practically constant. The characteristic length in the morphology, defined by the alternation of the crystalline and amorphous domains, does not increase in spite of the swelling of the amorphous phase. Therefore, the crystalline domains must become smaller, which may indicate that the grafted amor-

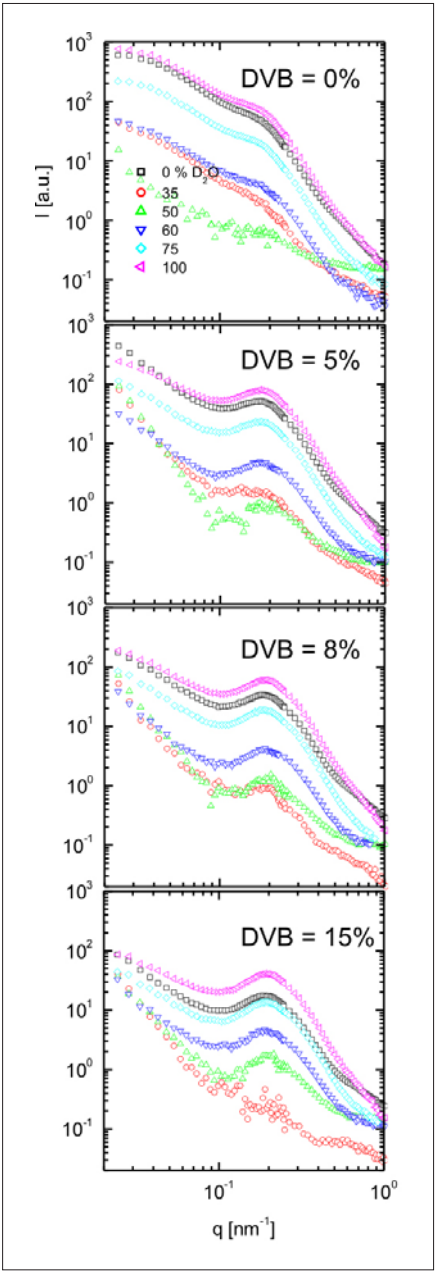

Figure 9: The azimuthally averaged scattering intensity of the hydrated membranes. For the contrast-variation study we applied six different mixtures of heavy and normal water: D2O/H2O (vol.% / vol.%) equal: 1.) 0/100, 2.) 35/65, 3.) 50/50, 4.) 60/40, 5.) 75/25, and 6.) 100/0. These mixtures covered the range of the scattering length densities of the polymers found in the membranes [14].

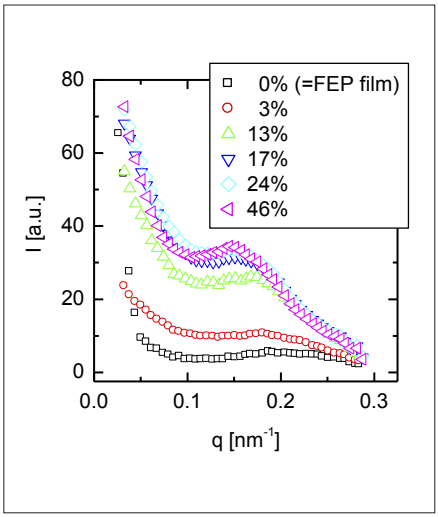

Figure 10: SAXS spectra of DVB cross-linked membranes at different level of grafting. The level of cross-linking is 10%. The scattering intensively grows and the peak position systematically shifts to lower q-values upon increasing the level of grafting [15].

phous domains swell on the cost of the crystalline phase of the FEP film.

It is interesting that only the scattering patterns of the cross-linked membranes show the regular changes in correlation peak with the grafting level. Without cross-linking, the nano-scale domain structure of the partially crystalline FEP film is not preserved: the correlation peak vanishes due to the dominant scattering at low q-values, which corresponds to fluctuations on a scale larger than 150-200 nm (Figure 12).

The copolymer formation shows a systematic dependence on the level of grafting and on the level of cross-linking. To stabilize the rather well defined domain structure already given by the original FEP base material, the samples need to be cross-linked. Without cross-linking the order between crystalline domains is decreased as reflected by the

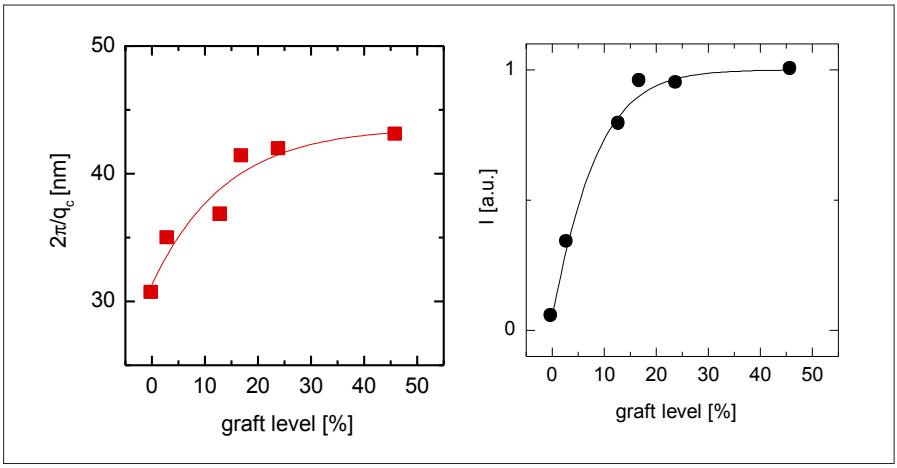

Figure 11: Characteristic length and the scattering intensity of the cross-linked FEP based membranes shown in Figure 10.

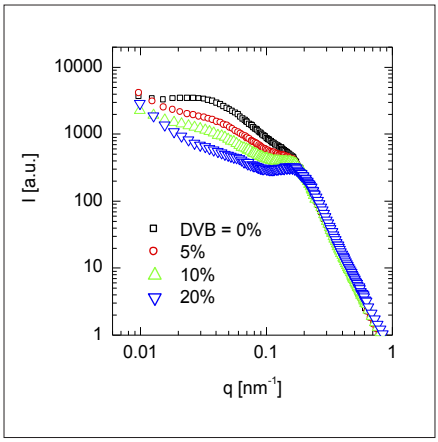

Figure 12: The small-angle scattering spectra of membranes synthesized with increasing level of cross-linking but a constant level of grafting (19%).

disappearance of the crystalline peak and the large-scale inhomogeneities in the structure dominate the scattering. The formation of large polystyrene-rich and -poor domains is driven by the immiscibility of FEP and polystyrene. However, this immiscibility is completely overcome by cross-linking the polystyrene. With cross-linking the morphology is still governed by the original alternating crystalline/amorphous structure given by the FEP base film.

5. SUMMARY AND CONCLUSIONS

We have shown how the use of neutrons supports the development of Fuel Cells fabricated at Paul Scherrer Institut. Neutron imaging comes to aid in order to understand the transport of water in the fuel cell and the impact on the performance. Furthermore, the presented results from SANS experiments can improve our understanding of the nano-scale morphology of proton-exchange membranes, which has direct consequences for the performance of the membranes in PEFCs.

6. REFERENCES

1. G. Kühne, G. Frei, E. Lehmann, P. Vontobel, A. Bollhalder, U. Filges and M. Schild, Swiss Neutron News 28, 20 (2005)
2. W. E. Fischer, Physica B 234, 1202 (1997)
3. E. H. Lehmann, G. Frei, G. Kühne and P. Boillat, Nucl. Instr. and Meth. A 576, 389 (2007)
4. P. Boillat, G. Frei, E. H. Lehmann, G. G. Scherer and A. Wokaun, Electrochem. Solid-State Lett. 13, B25 (2010)
5. K. D. Kreuer, T. Dippel. W. Meyer and J. Maier, Mat. Res. Soc. Symp. Proc. 293, 273 (1993)
6. S. Ochi, O. Kamishima, J. Mizusaki and J. Kawamura, Solid State Ionics 180, 580 (2009)
7. L. Gubler, G. G. Scherer, Adv. Polym. Sci. 215 (2008), 157
8. L. Gubler, G. G. Scherer, Adv. Polym. Sci. 215 (2008), 1.
9. Bhattacharya, B. N. Misra, Progress in Polymer Science 29 (2004), 767
10. M. M. Nasef, E. S. A. Hegazy, Progress in Polymer Science 29 (2004), 499
11. M. Eikerling, A. A. Kornyshev, E. Spohr, Adv. Polym. Sci., 215 (2008), 15
12. P. Strunz, K. Mortensen, S. Janssen, Phys. B: Condens. Matter, 350 (2004), E783.
13. C. J. Glinka, J. Barker, B. Hamouda, S. Krueger, J. J. Moyer, W. Orts, J. Appl. Cryst. 31 (1998), 430
14. S. Balog, U. Gasser, K. Mortensen, L. Gubler, H. Ben youcef, G. G. Scherer, Macromol. Chem. and Phys. 211 (2010), 635
15. K. Mortensen, U. Gasser, S. Alkan Gürsel, G. G. Scherer, Journal of Polymer Science Part B: Polymer Physics 46 (2008), 1660

9th PSI Summer School on Condensed Matter Research – Magnetic Phenomena

This year's PSI Summer School on Condensed Matter Research has taken place once again in Zuoz, and was entitled "Magnetic Phenomena". The goal of the School was to provide an educational platform for educating Ph.D. students and post-docs working in research fields where magnetism plays an important role. Like in the previous years, the atmosphere of the School was very open-minded and provided an ideal setting for learning (or reviewing) the basic concepts of some of the major materials science disciplines.

The school took place from Aug 7 through 13, and was followed by three days of practical exercises using PSI neutron, muon and X-ray instruments. The total number of participants was 114. There were 23 lectures delivered by a mix of external experts in their respective fields and PSI scientific staff. Fifty participants took the opportunity to present a poster at the School. The weather was mostly good, and allowed for a wide selection of outdoor activities in the afternoons and on the free morning on Wednesday when the participants could choose between organized tours into the Swiss National Park, river rafting and mountain hiking.

The scientific program started off early on a Sunday morning with two excellent introductions in the historical and theoretical aspects of magnetism, starting from the understanding of magnetism centuries ago to some of the corner stones of the modern understanding of magnetic moments and interactions. The School also included a set of lectures on major neutron, muon and X-ray instrumental

techniques most of which are available at the PSI. These were complemented by more scientific lectures that presented advanced and topical research themes. The pedagogical nature of the lectures provoked many questions, and not only of the students! At times it appeared that senior scientists had even more fundamental questions than the students. So many questions and vivid discussions created an atmosphere of learning which was one of the main goals of the School.

There were also a number of evening lectures that proved both entertaining and informative, particularly the lectures on magnetic monopoles and magnetic storage. The most entertaining lecture may have been the one on frog cells in high magnetic fields. The program of the School can still be found on the web under the following web site address: http://school.web.psi.ch/html/files/Zuoz-Tentative-programme-2010.pdf

The overall impression of the School was extremely positive, not least thanks to the efforts of the NUM Secretary Renate Bercher who was responsible for all the administrative aspects of the School. Naturally, the aperitif provided by our Society just before the Banquet on Thursday evening was very welcome with all the participants and created the proper atmosphere for the dinner afterwards.

This appeared to be the last Summer School on Condensed Matter Research in Zuoz, as the next year's school is scheduled to take place at the Institut Montana at Zugerberg. The long-term location of the School seems uncertain at the moment. After the extremely successful School in 2010 and the strong determination to continue with this School, it is clear that we will be able to enjoy many more years of PSI Summer Schools on Condensed Matter, wherever they may take place!

Michel Kenzelmann

Minutes of the SGN/SSDN General Assembly on 10.11.2010

Date/Locality: November 10, 2010, Paul Scherrer Institut, main auditorium
Begin: 18:30
End: 19:20
Participants: 13 members of the society

1. WELCOME

The president of the SGN/SSDN, Henrik Ronnow, welcomes the participants to the general assembly 2010.

2. MINUTES OF THE GENERAL ASSEMBLY 2009

The minutes of the general assembly of the SGN/SSDN from 13.10.2009 published in Swiss Neutron News #36 (December 2009) are accepted without objections.

3. ANNUAL REPORT OF THE CHAIRMAN

H. Ronnow reports on the activities of the SGN/SSDN in the year 2010:

a) An 'apero' was again sponsored by the Society at the PSI Summer School in Zuoz, August 8–13, 2010 (Magnetic Phenomena).
b) Two new issues of Swiss Neutron News will appear in 2010 (December issue in preparation).
c) The SGN/SSDN has presently 200 members, one more than in 2009.
d) The 16T Swiss magnet for SNS has been tested on three beamlines and a first user experiment using the magnet has taken place on beamline BL17 (SEQUOIA).

4.REPORT OF THE TREASURER

The annual balance sheet 2009 is presented:

Assets SGN/SSDN on 1.1.2009: **SFr 4153.11**

	Revenues [SFr]	**Expenses [SFr]**
Membership-fees (cash box)	200.–	
Membership-fees (postal check acc.)	338.08	
Donations (cash box)	5.–	
Interest	1.70	
Total expenses		555.00
– Apéro Zuoz (2009)		517.50
– Expenses PC account		37.50
Total	544.78	555.00
Net earnings 2009:	**– 10.22**	
Assets SGN/SSDN on 31.12.2009:	**4142.89**	

Balance sheet 2009:

	Assets [SFr]	**Liabilities [SFr]**
Postal check account	1854.39	
Cash box	2288.50	
Assets on 31.12.2009	**4142.89**	

5. REPORT OF THE AUDITORS

Bericht der Revisoren

Die Rechnungsrevisoren haben die Belege, die Abrechnungen und die Bilanz für das Jahr 2009 geprüft und für in Ordnung befunden!

21.1.10		26.1.10	
Datum	Dr. M. Zolliker, PSI	Datum	Dr. K. Krämer, Uni Bern

Both Auditors (K. Krämer and M. Zolliker) have examined the bookkeeping and the balance 2009. They have accepted it without objection. The participants therefore unanimously vote for a release of the SGN/SSDN board.

6. BUDGET 2010

The treasurer presents the following proposal for the budget 2011:

	Receipts [SFr]	**Expenditures [SFr]**
member fees	600.–	
interests	5.–	
fees PC account		40.–
Zuoz Apero 2010		700.–
Total	605.–	740.–
balance 2010	**–135.–**	

The participants accept the budget proposals unanimously.

7. NEWS FROM ENSA (H. RONNOW)

a) Michael Steiner, Helmholtz-Zentrum Berlin, was elected as the new chairman of ENSA as the successor of Peter Allenspach.

b) Since two years ENSA is a legel entity based in Switzerland.

c) The web-page of ENSA is no longer maintained by NMI3. A new host and master for the page needs to be found.

d) With the ESS-PP being completed, ENSA will focus on creating enthusiasm for ESS across Europe and on representing the users' perspective regarding ESS (complementary to facilities and governmental bodies). Furthermore, ENSA wants to support the whole range of European neutron sources and will not only focus on ESS. In this regard, it is of particular importance to make sure that governments do not cut their support for local neutron sources due to the construction of ESS.

e) ENSA also engages in taking influence in political discussions. In this regard, ENSA is in contact with the European Strategy Forum on Research Infrastructures (ESFRI).

f) ENSA is in contact with the European Synchrotron User Organization (ESUO) for the preparaton of the next Framework Program for Research FP8.

g) The European access program to research facilities NMI3 was cut down to 10M€€ It was reduced from four to two years and successfully got a new call within FP7.

h) The next European Conference on Neutron Scattering (ECNS) will be organized in Prague from July 17–21, 2011. The next International Conference on Neutron Scattering (ICNS) will take place July 7–11, 2013 in Edinburgh.

8. NEWS FROM ILL (K.N. CLAUSEN)

Kurt N. Clausen as the Swiss representative in the ILL Scientific Committee (SC) reports on the 83rd Scientific Council meeting held on October 21–22, 2010:

a) Prof. Chick C. Wilson, University of Bath, UK, was elected as the new chairman of the Scientific Council. Andreas Meyer, German Aerospace Center (DLR), Köln, Germany, became the new Deputy Chair. Also, the term of Kurt Clausen as Swiss representative was prolonged until June 30, 2012. His successor will be elected in 2011.

b) India has become a new member of ILL.

c) The ILL budget for 2011 is as yet undefined, as the UK contribution is uncertain. For the case of a reduced budget, the SC has pointed out the importance (i) to retain the ILL PhD program, (ii) to prefer an

earlier shutdown to the mothballing of instruments, (iii) to keep a proportional number of scientific positions, if staff cuts are necessary, or (iv) to postpone the M1 program (5 new instruments) if necessary. The SC also wants to be involved in the M2 program, which is planned for 2013–2017.

d) There was a healthy demand of beamtime, as 603 proposals have been handed in and 754 experiments have been carried out. There was a major increase of soft matter research proposals.

e) The communication and collaboration between ILL and ESS have improved. The SC commends that ILL should contribute to the ESS programme, while stressing its onwn strengths and plans for the future. The SC believes that the ILL will itself benefit from contributions to ESS.

f) The ILL-ESRF Partnership for Soft Condensed Matter (PSCM) progresses very slowly. The SC recommends to proceed without ESRF if necessary.

g) The ILL Vison user meeting took place Sept. 15–17, 2010. Many good ideas were presented that need to be pursued by external user groups. Robust science cases have to be presented before new funding initiatives can be started. Some of the presented ideas should be considered as parts of the proposed Instrument Review.

h) The SC wants to take part in the proposed Instrument Review and it commends to give instrument groups the opportunity to respond to recommendations made during a first fast review. Also, the SC recommends that the partnership with the deuteration laboratory (D-lab), the computing group (C-lab), and the theory group be included in the review.

i) Any comments and suggestions regarding the ILL should be addressed directly to Kurt N. Clausen, PSI.

9. NEWS FROM ESS

Anna Stradner and Kurt N. Clausen report on developments at ESS.

a) Since 1st of July 2010 ESS AB is a public company like ILL or ESRF.

b) There is a 16-nation Steering Committee, which includes Switzerland and meets four times per year to take care of administration and financial issues. (The UK is not a member.) A Technical (TAC) and a Scientific Advisory Committee (SAC) are in place. Kurt N. Clausen chairs the TAC.

c) The ESS project is in a 3-year Design Review Update until end of 2012. The construction phase is planned to start in 2013, first protons are expected in 2017/2018, and first neutrons in 2019.

Commissioning and the completion of the first instrument suite is planned for 2020–23.

d) A Memorandum of Understanding (MoU) is to be signed on Feb. 4th 2011 in Paris between the 16 partners to warrant a binding international convention that is expected to be signed in early 2013 to allow construction in a timely fashion. The MoU does not imply a legal commitment for the construction of ESS of the member countries, but the member counries signal their best intentions. The Swiss executive has confirmed that Switzerland is ready to sign the MoU.

e) The MoU includes that ESS will be located in Lund, Sweden, and a Data Management Center will be hosted in Copenhagen, Denmark. The ESS Laboratory Test Facility and Accelerator Components Factory will be built in Bilbao, Spain.

f) The TAC focuses on one target station for ESS, which should allow for 40 to 50 instruments and does focus on long, intense neutron pulses. The target material has not yet been selected (liquid Pb/Bi or solid target?). Furthermore, the moderator target reflector assembly, the beam optics for extracting 40 to 50 beam lines, and the accelerator target interface (beam window) still need to be defined.

g) The largest parts of the cost for the ESS Design Update are provided by Sweden (30M€) and Germany (20 to 30M€). For an effective participation of Switzerland, a joint involvement of Switzerland and Denmark is a possibility, as there are common scientific interests. Such a collaboration of Switzerland and Denmark might extend beyond the Design Update phase. A meeting with the Danish ministry took place on Nov. 26th, 2010.

10. MISCELLANEOUS

H. Ronnow points out that according to the Swiss agreement with the ILL, ILL funds and hosts one PhD student from Switzerland. This position is now open, as J. Rasch recently finished her thesis (congratulations!). A call to fill this position has been distributed by email to the SGN members and is also presented in this issue of Swiss Neutron News.

Furthermore, there is the regular ILL PhD program to which also Swiss researchers can apply. The contact person at ILL is Anne-Claire Dupuis (PhD@ill.eu).

U. Gasser
December 2010

Announcements

SGN/SSDN MEMBERS

Presently the SGN has 200 members. Online registration for new members of our society is available from the SGN website: http://sgn.web.psi.ch

SGN/SSDN ANNUAL MEMBER FEE

The SGN/SSDN members are kindly asked to pay their annual member fees. The fee is still **CHF 10.–** and can be paid either by bank transfer or in cash during your next visit at PSI. The bank account of the society is accessible for both Swiss national and international bank transfers. The coordinates are as follows:

Postfinance: 50-70723-6 (BIC: POFICHBE), IBAN: CH39 0900 0000 5007 0723 6

PSI FACILITY NEWS

PSI launched a **quarterly electronic newsletter** featuring recent news, events and scientific highlights of the three major PSI user facilities SLS, SINQ and SμS. The online version of the recent edition is available here: http://www.psi.ch/info/facility-news

SINQ CALL FOR PROPOSALS

The next **deadline** for the submission of beam time requests for the Swiss spallation neutron source 'SINQ' (http://sinq.web.psi.ch) will be: **May 15, 2011.**

JUM@P '11 USERS' MEETING

The second joint users' meeting of SINQ, the Swiss Muon Source SμS, and the Swiss Light Source SLS will take place September 15-16 at PSI. Information about the meeting is available under:

http://indico.psi.ch/event/jump11

REGISTRATION OF PUBLICATIONS

Please **remember to register all publications either based on data taken at SINQ, SLS, SμS or having a PSI co-author** to the Digital User Office: https://duo.psi.ch. Please follow the link 'Publications' from your DUO main menu.

OPEN POSITIONS AT ILL

To check the open positions at ILL please have a look at the following ILL-Webpage:

http://www.ill.eu/careers

PAUL SCHERRER INSTITUT

10th PSI Summer School 2011

Probing Phase Transitions using Photons, Muons and Neutrons

Lectures: August 13–19, 2011
Institut Montana Zugerberg, Switzerland

Organizers:
J.F. van der Veen (chair), K. Clausen, R. Abela, S. Müller, C. Quitmann, J. van Bokhoven, S. Johnson, S. Janssen, E. Morenzoni, C. Mudry, J. Schefer, C. Rüegg, M. Kenzelmann, D. Jahns (secretary)

Registration:
www.psi.ch/summer_school_11
Contact: zug2011@psi.ch
Deadlines: Early registration: 30 April, 2011
Regular registration: 30 June, 2011

Selection of invited speakers

External experts: B. Batlogg, ETH Zurich; J. Blatter, ETH Zurich; F. Carbone, EPF Lausanne; R. De Renzi, University of Parma; M. Fiebich, University of Bonn; P. Glatzel, ESRF Grenoble; S. Klotz, University Pierre and Marie Curie Paris; P. Macchi, University of Berne; D. McMorrow, UCL London; M. Müller, ICTP Trieste; W. Paulus, University of Rennens; G. Smolentsev, University of Lund; A.W. Sandvik, University of Boston

PSI experts: U. Gasser, S. Johnson, M. Kenzelmann, R. Khasanov, C. Mudry, C. Rüegg, J. van Bokhoven, O. Zaharko

Scope

Phase transitions are not only a well known fact of everyday life, but also an important field of current research and of technological applications. In this summer school more than 20 world-class experts will introduce the different aspects of phase transitions from an experimental and theoretical point of view. Following the school a practical training at PSI will allow about 25 students to gain hands-on experience with state-of-the-art instrumentation using photons, neutrons and muons.

Practical Training: Photons, Muons, Neutrons
August 20–22, 2011
Paul Scherrer Institut, Villigen, Switzerland

Conferences and Workshops 2011

(an updated list with online links can be found here: http://www.psi.ch/useroffice/conference-calendar)

FEBRUARY

- 26th Lorne Conference on Protein Structure and Function
  February 6–10, 2011, Lorne, VIC, Australia
- AXAA2011: Schools, advanced workshops, conference and exhibition
  February 6–11, 2011, Sydney, Australia
- ESRF Users' Meeting 2011 & Associated Workshops
  February 7–10, 2011, Grenoble, France
- AAFS 2011: American Association of Forensic Sciences
  February 21–26, 2011, Chicago, IL, USA
- NASCES11: Neutron Application on Strongly Correlated Electron System
  2011 February 23–25, 2011, Tokai, Japan
- TMS 2011: 140th Annual Meeting & Exhibition
  February 27– March 3, 2011, San Diego, CA, USA
- HERCULES 2011
  February 27–March 30, 2011, Grenoble, France

MARCH

- Second Conference on the Physics of Sustainable Energy
  March 5–6, 2011, Berkeley, CA, USA
- Biophysical Society 55th Annual Meeting
  March 5–9, 2011, Baltimore, MD, USA
- GPCCG 2011: German-Polish Conference on Crystal Growth
  March 14–18, 2011, Frankfurt/Oder, Germany and Słubice, Poland
- ICDD 2011 Spring Meetings
  March 14–18, 2011, Newton Square, PA, USA
- 7th Workshop on Structural Analysis of Aperiodic Crystals
  March 17–20, 2011, Bayreuth, Germany
- 20th West Coast Protein Crystallography Workshop
  March 20–23, 2011, Monterey, CA, USA
- APS March Meeting 2011
  March 21–25, 2011, Dallas, TX, USA

- ICKEM 2011: 2011 International Conference on Key Engineering Materials
  March 25–27, 2011, Sanya, China

- 19th Texas Protein Folders Meeting
  March 25–27, 2011, Navasota, TX, USA

- 13th Intensive Teaching School in X-ray Structure Analysis
  March 26–April 3, 2011, Durham, UK

- PAC'11: 2011 Particle Accelerator Conference
  March 28–April 1, 2011, New York, NY, USA

APRIL

- ACTOP11: 4th Workshop on Active X-ray & XUV Optics
  April 4–5, 2011, Didcot, UK

- Microscopy of Semiconducting Materials XVII
  April 4–7, 2011, Cambridge, UK

- Synchrotron Radiation and Free Electron Lasers, Joint US-Cern-Japan-Russia School
  April 6–15, 2011, Erice, Italy

- 16th Annual Structural Biology Symposium
  April 8, 2011, Galveston, TX,USA

- 34th Annual British Zeolite Association Conference
  April 11–13, 2011, Edinburgh, UK

- BCA Spring Meeting 2011
  April 11–14, 2011, Keele, UK

- Improving the data quality and quantity for XAFS experiments
  April 12–13, 2011, Tsukuba, Japan

- Euro BioMat 2011: European Symposium on Biomaterials and Related Areas
  April 13–14, 2011, Jena, Germany

- School on Fundamental Crystallography
  April 25–29, 2011, Mahdia, Tunisia

- MRS Spring Meeting - Symposium J: Protons in Solids
  April 25–29, 2011, San Francisco, CA, USA

MAY

- APS/CNM/EMC Users Meeting
  May 2–5, 2011, Argonne, IL, USA

- ICDD XRF Clinic - Practical X-ray Fluorescence
  May 2–6, 2011, Newtown Square, PA, USA

- 3rd APPA Conference in conjunction with the 3rd Symposium of the CPS
  May 6–9, 2011, Shanghai, China

- Energy Materials Research by Neutrons and Synchrotron Radiation
  May 9–11, 2011, Bad Honnef, Germany

- ICAM 2011: E-MRS Spring Meeting and IUMRS
  May 9–13, 2011, Nice, France

- ICSG 2011: Int. Conference on Structural Genomics
  May 10–14, 2011, Toronto, ON, Canada

- PPXRD-10: 10th Pharmaceutical Powder X-ray Diffraction Symposium
  May 16–19, 2011, Lyon, France

- CORALS-II-2011: 2nd International Meeting on Micro-Raman and Luminescence Studies in the Earth and Planetary Sciences
  May 18–20, 2011, Madrid, Spain

- IXth European Symposium of The Protein Society: Wonders and disasters of the protein world
  May 22–26, 2011, Stockholm, Sweden

- 3rd Int. School on Biological Crystallization
  May 22–27, 2011, Granada, Spain

- MaThCryst Workshop on Crystallography Software
  May 23–27, 2011, Tokyo, Japan

- M2011 ACA Meeting
  May 28–June 2, 2011, New Orleans, LA, USA

- 5th Central European Training School on Neutron Scattering
  May 31–June 4, 2011, New Orleans, LA, USA

JUNE

- ICCS 2011: Eleventh International Conference on Computational Science
  June 1–3, Tsukuba, Japan

- The Power of Powder Diffraction
  June 2–12, Erice, Italy

- Electron Crystallography - New Methods to Explore Structure and Properties of the Nanoworld
  June 2–12, Erice, Italy

- ICDD XRD Clinic - Session I - Fundamentals of X-ray Powder Diffraction
  June 6–10, Newton Square, PA, USA

- Second Course on Neutron Scattering Applications in Structural Biology
  June 7–11, Oak Ridge, TN, USA

- Materials Characterisation 2011. Fifth International Conference on Computational Methods and Experiments in Materials Characterisation
  June 13–15, 2011, Kos, Greece

- Nanotech Conference & Expo 2011
  June 13–16, 2011, Boston, MA, USA

- ICDD XRD Clinic - Session II - Advanced Methods in X-ray Powder Diffraction
  June 13–17, 2011, Newton Square, PA, USA

- Resonant Elastic X-ray Scattering in Condensed Matter
  June 13–17, 2011, Aussois, France

- The Zurich School of Crystallography: Bring Your Own Crystal
  June 13–26, 2011, Zürich, Switzerland

- EMC2011: Electronic Materials Conference 2011
  June 22–24, 2011, Santa Barbara, CA, USA

- 5th International Workshop on Crystal Growth Technology
  June 26–30, 2011, Berlin, Germany

- European Fuell Cell Forum 2011
  June 28–July 1, 2011, Luzern, Switzerland

- MaNEP Summer School
  June 29–July 1, 2011, Les Diablerets, Switzerland

- EEuropean Lab Automation, including Advances in Protein Crystallography
  June 30–July 1, 2011, Hamburg, Germany

JULY

- iWoRID 2011: International Workshop on Radiation Imaging Detectors
  July 3–7, 2011, Zürich, Switzerland

- 5th European Conference on Neutron Scattering
  July 17–22, 2011, Prague, Czech Republic

AUGUST

- Thermec 2011: Neutron Scattering and X-Ray Studies of Advanced Materials
  August 1–5, 2011, Quebec, Canada

- 10th PSI Summer School on Condensed Matter Research: Phase Transitions
  August 13–20, Zug, Switzerland

- REI-16: 16th International Conference on Radiation Effects in Insulators
  August 14–19, 2011, Beijing, China

- IUCr-2011: 22nd General Assembly and Congress of IUCr
  August 22–29, 2011, Madrid, Spain

SEPTEMBER

- ACIN 2011: International Symposium on Advanced Complex Inorganic Materials
  September 11–14, 2011, Namur, Belgium

- JUM@P 11: Second Joint Users Meeting at PSI
  September 15–16, 2011, Villigen, Switzerland

- Joint Meeting of the German Crystallographic Society (DGK), German Mineralogical Society (DMG) and Austrian

Mineralogical Society (ÖMG)
September 20–24, 2011, Salzburg, Austria

APRIL 2012

- ARRS 2012: Meeting of the American Roentgen Ray Society
  April 29–May 4, 2012, Vancouver, Canada

NOVEMBER 2012

- SAS2012: International Small-Angle Scattering Conference
  November 18–23, 2012, Sydney, Australia

Swiss Neutron Scattering Society
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