

Proceedings of the International Workshop on Current Challenges in Liquid and Glass Science, (The Cosener's House, Abingdon 10–12 January 2007)

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**PREFACE****Proceedings of the International Workshop on  
Current Challenges in Liquid and Glass Science,  
(The Cosener's House, Abingdon 10–12 January 2007)**

The workshop was held to discuss current experimental and theoretical challenges in liquid and glass science and to honour the contribution made by Spencer Howells (ISIS, UK) to the field of neutron scattering from liquids and glasses. The meeting was attended by 70 experimentalists, theorists and computer simulators from Europe, Japan and North America and comprised 34 oral presentations together with two lively poster sessions. Three major themes were discussed, namely (i) the glass transition and properties of liquids and glasses under extreme conditions; (ii) the complementarity of neutron and x-ray scattering techniques with other experimental methods; and (iii) the modelling of liquid and glass structure. These themes served to highlight (a) recent advances in neutron and x-ray instrumentation used to investigate liquid and glassy materials under extreme conditions; (b) the relationship between the results obtained from different experimental and theoretical/computational methods; and (c) the modern methods used to interpret experimental results.

The presentations ranged from polyamorphism in liquids and glasses to protein folding in aqueous solution and included the dynamics of fresh and freeze-dried strawberries and red onions. The properties of liquid phosphorus were also memorably demonstrated! The formal highlight was the 'Spencerfest' dinner where Neil Cowlam (Sheffield, UK) gave an excellent after dinner speech. The organisation of the workshop benefited tremendously from the secretarial skills of Carole Denning (ISIS, UK).

The financial support of the Council for the Central Laboratory of the Research Councils (CCLRC), the Liquids and Complex Fluids Group of the Institute of Physics, The ISIS Disordered Materials Group, the CCLRC Centre for Materials Physics and Chemistry and the CCLRC Centre for Molecular Structure and Dynamics is gratefully acknowledged.

Finally, it is a pleasure to thank all the workshop participants whose lively contributions led to the success of the meeting. The present special issue stems from the interest of many of those present to collect their work into a single volume.

**DEDICATION****William Spencer Howells**

It is a great pleasure to dedicate this Special Issue on Current Challenges in Liquid and Glass Science to the many contributions Spencer Howells has made to the structure and dynamics of liquids and glasses over some 40 years of work with the neutron scattering technique.

After completing a first degree in Physics at Cambridge in 1966, Spencer started a postgraduate program with Gordon Squires at Cambridge, exploiting the early neutron scattering instrumentation that was available in those days at the Harwell reactors. This resulted in a PhD thesis in 1970 on the twin topics of 'Neutron scattering of phonons in single-crystal



**Figure 1.** The workshop participants. Spencer Howells is in the centre of the front row.

molybdenum, using a time-of-flight chopper spectrometer (Part I)' and 'Neutron studies of the metal-insulator transition (Part II)'. The thesis was split into two parts because the hydrogen moderator blew-up on the chopper instrument used for the first part!

From Cambridge, he moved to Leicester University as a post-doctoral Fellow with John Enderby, who was setting up a programme of study on the liquid state of matter. Here Spencer continued to use the Harwell Dido reactor, now to measure the structure of liquid metal alloys and molten salts - a topic that has kept his interest right through into retirement. He also initiated the first structural studies of aqueous solutions using neutron scattering, eventually pursuing this work as one of the first UK users of the Institut Laue-Langevin, Grenoble, France (ILL).

In 1973 Spencer moved to the ILL, which was then and has remained the world's leading steady-state neutron source, as instrument scientist on IN10, the quasi-elastic neutron scattering beam line. Here he led the field in developing the quasi-elastic technique and new quasi-elastic scattering experiments were begun on the dynamics of aqueous solutions. At the same time he was local contact for most of the UK users of the liquids diffractometer D4, often providing excellent hospitality to hungry and thirsty PhD students, in addition to his scientific support!

After the ILL he moved, in 1978, to the Spallation Neutron Source (SNS), later called ISIS, where he was responsible for building the Liquids and Amorphous Diffractometer, LAD. This was a tricky undertaking as there were no neutrons at the SNS until 1984, so initial testing of LAD was done on the Harwell Linac. He also worked on the design and specification of the SNS moderators and collimation, and his design for the neutron collimator is still in use at ISIS today. The initial design and build of the Small Angle Neutron Diffractometer for Amorphous and Liquid Samples (SANDALS) was undertaken in this period, and Spencer had a major impact on the development of the ATLAS software used to analyse diffraction data from disordered materials. He was also involved in the design of IRIS, the first quasi-elastic spectrometer at ISIS.

As more people joined in liquids and amorphous materials research at ISIS, Spencer was able to diversify, and he took an increasing interest in the application of IRIS to liquid materials. Here he brought his expertise in data analysis from the ILL and LAD and applied it to the

time-of-flight quasi-elastic technique. The suite of data analysis programs that evolved, called IDA, was enlarged to encompass quasi-elastic neutron scattering data taken on a number of ISIS and non-ISIS instruments, including OSIRIS, HET, and MARI (at ISIS), IN5, IN6, IN10, IN13 and IN16 (at ILL) and NEAT (at HMI, Berlin). At the same time, Spencer's penchant for working on computers meant he took an increasingly important role in setting up and running the ISIS user database and proposal system, which continued for many years until his retirement in 2004. He also became full-time instrument scientist on IRIS and even after retirement he continues to work on developing data analysis software for this instrument.

In the course of his career Spencer Howells has so far produced more than 200 scientific publications, covering a broad spectrum of topics. Recent examples include 'Dynamics of fresh and freeze-dried strawberry and red onion: quasielastic neutron scattering.' and 'The structure and dynamics of 2-dimensional fluids in swelling clays', to illustrate some of the range of his science. This work has gone hand in hand with comprehensive support for users at the ILL, ISIS and elsewhere, and he has been a consultant at foreign institutions such as the Intense Pulsed Neutron Source (IPNS) at Argonne National Laboratory, Illinois. Arriving as he did at a time when large-scale central user facilities were first becoming established, Spencer has played a significant role in shaping the way these facilities operate and produce science. The Current Challenges Workshop was a fitting tribute to his work in disordered materials science and demonstrates how vibrant the field has become as a result.

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