

SGT NEWS



GLASS OPPORTUNITIES: HERITAGE, HISTORY AND CONSERVATION

The Society of Glass Technology (SGT) and the UKIC Ceramics and Glass Group joined forces to mount a one day conference on Wednesday 7 June 2000 at the newly opened World of Glass in St Helens. The conference tied in with the annual spring meeting of the SGT, which took place at the same venue under the title *Glass Opportunities from mixing to melting* from Wednesday 7 June to Friday 9 June. The organisation of the meeting meant there was a possibility to create a context for a sharing of interests between two groups involved with glass.

The World of Glass is supported by the Heritage Lottery Fund and partly financed by the European Community. The £14 million centre provides a new home for the local authority museum collection and the collection formerly housed at the Pilkington Glass Museum.

LASER CLEANING

Lynne Kelley of the NMGM Conservation Centre, Liverpool, and chair of the Ceramics and Glass Conservation Group welcomed the participants and audience to the first joint meeting. The first presentation of the day was by Dr Hannelore Romich, of the Fraunhofer-Institut für Silicatforschung in Germany, who described research into the use of lasers to remove surface layers from historic stained glass windows. Laser beam cleaning or ablation is not new but it has not yet reached successful implementation. There are several developments in laser technology, which are increasing the options. The laser used by the Fraunhofer group were KrF excimer lasers, which provide short pulses with high power output but low thermal penetration. A rig was built to hold the laser stationary while controlling the movement of the glass to be cleaned. The tests were initially carried out on model glass pieces with simulated levels of exposure before being used on pieces of glass taken from cathedrals around Germany.

The problem with laser cleaning is that the weathering crusts on the glass tend to be tougher than the glass. The power needed to remove crusts will burn through glass, causing real damage. So how can the crust be removed without harming the glass? The German researchers decided to analyse the spectra of back-scattered light from the ablated surface to get quick feedback on the type of layers removed. Work is continuing to develop process control techniques before the three year research project finishes in October this year.

GLASS CONSERVATION

An overview of glass conservation and its ethics was presented by Sandra Smith, head of inorganic conservation at the British Museum. Glass is the only material before the appearance of plastics in the 20th century with such unique properties of transparency and opacity. There is a vast amount of glass from ancient times through to the last century, which should be conserved and displayed to the public. The conservator must clean them, fill in the holes or missing sections and put them back together. Should the corrosion crusts be removed and the transparency restored or will their removal destroy evidence of what the conditions were like during their exposure to the environment? Removal of the crusts from decorated glass may also take away the very evidence of what the object may have looked like. The corrosion layers were removed from the Portland Vase to reveal a historical work of art. In contrast, is it necessary to restore the transparency of a crizzled drinking vessel? Conservators are responsible for the public perception of the work in their charge. They have to respond to society's needs but also have a perspective on future demands. With glass, there is always the need to understand the condition of glass and its properties.

Dr Norman Tennant, a conservation scientist for Fyne

Conservation Services in Argyll, discussed the relevance of refractive index for glass conservation. The 'invisible mending' of broken glass artefacts highlights the need of the conservator to make best use of the practical information to hand. A poor quality restoration of the past would use opaque glue that left visible cracks. Some even have evidence that the glue has been rubbed down, leaving surface abrasion. Others use glue, which induces stresses into the glass and causes further damage.

Glass is visible because it refracts light and different glasses having different refractive indexes. The challenge for the conservator is to get a good match between the glass and the adhesive so that the repair will not detract from the object when it is on display. Dr Tennant has compiled a table with refractive indices for various glass types and the available adhesives. Silicone resins are outside the range held by most glass types. Cellulose resins are closer and polyester and epoxy resins are good matches for lead crystal and medieval glass. Care has to be taken with adhesives beyond just matching refractive indices. Ageing epoxy resins can yellow. Some resins can also take time to fully cure and reach their final refractive index.

MEDIEVAL PROCESS

After lunch and some time for discussion, Dr Caroline Jackson, of the Department of Archaeology and Prehistory, and Jim Smedley, of the Department of Engineering Materials at the University of Sheffield, described the manufacture of glass in the late Medieval period. Evidence from an excavation at Little Birches in Staffordshire was published some years ago, which indicated that flat glass, most likely by the crown method, was made between the 14th and 16th centuries. One



LOCAL SECTION CONTACTS

For details of forthcoming local section events in your area, contact the following. All SGT members and non-members welcome.

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Midlands
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Gorebond Ltd,
37 Manor Abbey Road,
Halesowen,
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Tel 0121 422 5425.

North East
– Mr J Henderson,
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Throckley, Newcastle
upon Tyne NE15 9BE.
Tel 0191 264 4775.

North West
– Dr D Martlew,
Pilkington Technology
Centre, Hall Lane,
Lathom, Ormskirk,
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Scottish
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Yorkshire
– Miss R M Sales,
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NORTH AMERICA
– Dr A G Clare,
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furnace has been dated to the earlier date and three to the latter. There are extensive and substantial amounts of glass waste and broken crucibles in tips around the site. Climate evidence for the period indicates that it was too cold for beech trees to become established this far north, so the commonest source of wood ash was not present for the glassmakers. White silica pebbles are present all over the area, which may have been crushed and used as one of the raw materials or else sand was brought from elsewhere. Plant ash was used to provide the alkali needed to reduce the melting temperature to something practical. Since beech ash was not available for glassmaking, the team from Sheffield looked at other sources of plant ash and decided to experiment with bracken fern ash because it was a common plant in the area. There is also documentary evidence that the fern was sold to glass houses of the time. Around six football pitches worth of bracken was harvested to provide 360kg of material. This was burned to give 5.5kg of ash. Some replica glass melts were made from both bracken ash and beech ash. Beech ash gave a deep brown opaque glass while bracken ash gave a pale green transparent glass, which looked similar to the waste glass found on the tips. As a first attempt to simulate the glass made in the area, there was still some way to go before a similar chemical composition could be found to match the glass found on the tips. More work will take place with other plant ash samples, the most obvious being birch, to build up a larger body of evidence for the glassmaking practices of the time.

CONTINUING FIGHT

The Glass Gallery at the Victoria & Albert Museum has one of the largest collections of glass vessels in the country. Victoria Oakley, head of ceramics and glass conservation, described the continuing fight to halt the inevitable effects of time. A survey in 1992, before the opening of the new Glass Gallery, showed that 10% of the collection was at risk. The surface of the problem glass had a fogged or misty appearance. With exposure to greater humidity it may look as though it is weeping. Close inspection showed evidence for micro-cracking, pitting or a sugary surface. The alkali used to help melt the glass when it was first made makes it weak to corrosion by water. A humid atmosphere enables an ion exchange reaction to be established with a gel forming on the surface. If this is left to progress the glass will collapse under

its own weight. Conservation is difficult and damage is irreversible. At 42% relative humidity potassium will start weeping from the glass. Therefore, preventative action requires humidity at a stable temperature to be kept below 42%. Intervention may entail the use of a synthetic polymer coating, which can be removed without causing further damage. Failed items have to be supported. There has been some research in partnership with the Imperial College to find a cure for sick glass, which has led to a process in which the glass surface is dehydrated and impregnated with silane resins. This sort of active surface treatment poses an ethical problem, however, for if the life is to be prolonged then an irreversible process may be acceptable.

LEADED GLAZING

Tom Kupper, of Lincoln Cathedral, described the conservation of historic stained glass windows but concentrated his talk on plain leaded glazing. No value has been placed on plain glass compared to painted glass. It is difficult to date such glass and it is difficult to date while recognising that it needs to be conserved with sensitivity. The whole aspect of the window should be considered along with the glass, lead, woodwork and mortar. If a replacement is required, it has to match the original. Previous work may not have been achieved with enough sensitivity. Panels within a window have not been replaced in the correct orientation. A refit has to sometimes include a re-ordering within the frame. Patination on the surface of the clear glass brings a certain beauty. Take off too much and one may lose the feel of the glass and it will begin to stand out, breaking the uniformity.

In a second talk by Dr Hannelore Romich an evaluation of cleaning techniques on sensitive medieval glasses was discussed. She concentrated on the corrosion of



stained glass windows and the different corrosion phenomena that may exist in a single window panel. She explained complimentary cleaning techniques that have been used and analysed on aged model glass blocks in order to establish a glass conservation course in Germany, which promotes the best practice.

Cloisonné is a decorative technique using glass beads or powder sandwiched between two flat glass plates, which was popular for a 30-year period around 1900. Metal strips are used to divide the colours within the sandwich and fish glue is used to hold the coloured glass in place. The division of the colours by the metal strips could be used to build up some effective pictures for windows and screens or for decorating furniture. Sandy Davison introduced the style to the audience and talked through the methods used to restore a glass ceiling light made in this way. Catalogues from the time boast around 800 different shades and tints, which poses a problem in modern restoration to reproduce the original colour. Degradation of the fish glue and corrosion of the frame meant there was room for the beads to move within the sandwich, which led to a mixing of the colours. The colours had to be separated cleaned and replaced in a very detailed job. The frame was then built up with the metal strips and the coloured glass filler, before being sandwiched together.

The final part of the day included a guided tour around the World of Glass with its curator, Joanne Howdle, and a demonstration of glassmaking in the centre's studio. ■

IN PRINT

The August issue of *Glass Technology* has papers from the Society's *Glass Opportunities-mixing to melting meeting*, as well as peer reviewed papers on: a recommended procedure for the determination of lead and cadmium at trace levels in glass, energy saving effect with honeycomb crown, and simulation of glass fibre forming.

The August issue of *Physics and Chemistry of Glasses* has refereed papers on: electrolytic nature of ac/dc conduction in lithium triborate glass, x-ray photoelectron spectroscopy study of the germanate anomaly in the $\text{Na}_2\text{O-GeO}_2$ system, an XPS and EXAFS study of the interaction between cerium ions and glass surfaces, spectral studies of naphthalocyanine (Nc) and rare earth phthalocyanine (RePc) molecules in an inorganic glassy borate matrix, dependence of ionic mobilities in mixed cation glasses on the nature of the mobile cations, phase separation and the mixed alkali effect, preparation and properties of $\text{InF}_3\text{-GaF}_3\text{-PbF}_2\text{-ZnF}_2\text{-CdF}_2\text{-LaF}_3\text{-HfF}_4$ glasses, and preparation and properties of $\text{InF}_3\text{-GaF}_3\text{-PbF}_2\text{-ZnF}_2\text{-CdF}_2\text{-LaF}_3\text{-HfF}_4$ glasses.



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FOURTH UK AND IRELAND SOL-GEL GROUP MEETING

The Society of Glass Technology (SGT) is to hold its fourth UK-Ireland Sol-Gel meeting on 11 and 12 September 2000 at Nottingham Trent University.

The meeting will follow the format of previous meetings with an introductory session on the first evening from around 5pm, followed by a

full day of presentations and discussions to 4.30pm. The Royal Society of Chemistry is the sponsor. Dr Carole Perry, of the university's Department of Chemistry and Physics, is the host. The following people have agreed to give talks:

● Professor Helmut Schmidt, director of the Institute for New Materials, Saarbrucken - *Sol-Gel techniques as an interesting basis for new industrial products.*

● Dr Ron Jones, Horizon Technology - *Freeze gelation as a route to ceramics.*

● Prof John Hay, Surrey University - *Hydrolytic versus non-hydrolytic routes to Sol-Gel hybrids.*

● Prof Larry Hench, Imperial College of Science, Technology and Medicine - *A genetic theory of bio-active materials.*

● Dr Alan Taylor, TWI - *Hardness measurements of Sol-Gel materials.*

● Prof Alan Atkinson, Imperial College of Science, Technology and Medicine - *Abrasion resistant coatings for the protection of steel substrates.*

Contributions from academic research groups, research institutes and industrial companies will provide additional oral and poster presentations. There will be an award for the best poster, which should be no larger than A0.

Cost: Academic staff and students £60 and industrialists £90, which includes attendance at all lecture and poster sessions, accommodation on 11 September in an en-suite single study bedroom, all meals from dinner through to afternoon tea on 12 September, conference abstracts and use of poster boards.

For further information, email Karen Boston at the SGT at Karen@sgt.org. Abstracts from the presentations will be posted on the SGT website once the programme has been confirmed. ■

President:
John F B Clark,
FSGT.

Honorary Secretary:
Brian McMillan.

Honorary Treasurer:
Mr R T Montgomery,
CA, FSGT.

WHERE GLASSES AND CERAMICS MEET

The SGT and the Institute of Materials Ceramics Science Group are to hold a one-day conference on Monday, 20 November 2000, at the Pilkington European Technical Centre in Lancashire.

The conference will run from 10am to 4.30pm. Six papers will be presented during the day but there will also be opportunities for discussion and poster presentations. The organising committee encourages students and younger researchers to submit relevant posters. Experience has shown that the presentations and resulting discussions considerably enrich the conference. It is intended that the oral presentations and the posters will be published in a proceedings' volume after the event.

Studies of glasses and ceramics often meet and overlap, in spite of them being thought specialist endeavours. The aim of the one-day conference is to bring together disparate groups who are likely to have common interests and who may benefit from the dialogue. Such a conference is likely to help participants to forge personal links, which cross the barriers of specialisation. An SGT communication nearer the time will give details of the programme of presentations. Topics include unusual applications for Sol-Gel derived materials, deformation of white ware in high temperature conditions, evolution of white ware micro-structures during firing, corrosion of refractory ceramics in contact with molten glass, surface mechanical responses of glasses and ceramics, development of lead-free glazes, and stained and painted glazing. Speakers will include Prof Bill Lee of Sheffield University, Prof Frank Riley of Leeds University and Dr Julie Yeomans of Surrey University. The fee is £40/person, which includes refreshments and a light lunch. Members of the Institute of Materials and the SGT qualify for a discounted fee of £30. There is a special rate of £20 for full-time students. For details and reservations email Karen Boston at the SGT at Karen@sgt.org. Abstracts from the presentations will be posted on the SGT website once the programme has been confirmed. ■



NEW BOOKS

Ceramics and glass: a basic technology by Charles Bray

At first sight, the two crafts of producing pottery and making articles in glass seem to be completely separate, however, they have a great deal in common. One process involves the cold working of a plastic material, which becomes permanently hardened by firing, while the other consists largely of operating with a very hot molten material which hardens on cooling.

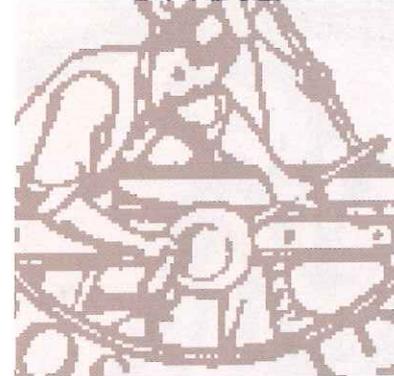
When fired to a biscuit state, clay is still fairly porous and usually needs to be made impervious to water. Glazing involves the firing of a thin layer of glass onto the surface of the biscuit form, which then seals and fills the pores of the material.

Bray, who also wrote *A Dictionary of Glass*, has produced a

book which deliberately brings together ceramics and glass because there is much information, normally attributed to one area, which seriously affects the other. It has been written for students, potters and glassmakers who work individually or in small studios. It is intended to be an easy reference source.

The author was principal lecturer in ceramics and glass in the Faculty of Art and Design at Sunderland Polytechnic, now the University of Sunderland. He was responsible for initiating the degree course in glass and ceramics and was involved in the setting up of the first glass centre in Sunderland. He has organised many conferences and his activities have helped to stimulate the interest in glass in the area.

For many years, he was treasurer and membership secretary of British Artists in Glass, and was its first elected life member. He served on the panel of Northern Arts for many years. He is a Fellow of the SGT, an honorary Fellow of the University of Sunderland and a Fellow of the Royal Society of Arts. He has worked in most of the major



glass collections and exhibits mostly in Europe.

The 280-page book measures 234mm x 156mm and has colour illustrations throughout. ISBN 0-900682-30-2. Price: Paperback £25 or £19 for SGT members; hardback £35 or £27.50 for SGT members.

The Window Glass Makers of St Helens by R A Parkin

This is a record of window glassmaking by the Pilkington brothers in Grove Street, St Helens, from 1826 to 1952. It is wholly about the sheet and rolled glassmaking factory, known as Sheet Works, which was only a short distance from the town centre. The town was the birth place of the brothers, who originally founded the St Helens Glass Company in 1826 and started glass making under the Old Cone, or No 1 House, near the St Helens canal.

The role of the Pilkington Brothers has long been recognised but it takes more than a hierarchy to establish the foundations of an industry that has become an influence worldwide. The book is a tribute to the people of St Helens, who could call themselves glassmakers, gatherers, blowers, teasers, producer men, splitters, cutters and carriers, supplemented by the claymakers, masons, smiths, sand getters and later the chemists, engineers and designers, all of whom inherited the unusual spirit and character of the little township.

The book contains sketches of the various factory layouts, which are based on interviews with retired Pilkington employees, the company's archive and the author's own experiences.

The 128-page A5 paperback is illustrated in black and white. ISBN 0-900682-28-0. Price: £12.50 or £7.50 for SGT members. ■

ELECTRONIC DISTRIBUTION OF NOTICES

In addition to regular circulation by ordinary mail, SGT will circulate notices to members who provide their e-mail addresses for the service. To join, please send your details to: sara@sgt.org. There will also be an opportunity to add these details on the backs of membership renewal notices due out later in the year.

GLASS-NETWORK ON MAILBASE

Mailbase is the UK's major electronic discussion list service for special interests and is a free service. It uses electronic mail to enable groups to talk to each other and to share information. There are over 2600 lists covering subjects such as air pollution, British poets, consumer studies, dental health, ergonomics and food. The SGT has established the Glass-Network on Mailbase to promote discussion of all sorts of glass subjects. The scope for discussion is a function of its constituent members. Users can be anywhere in the world and do not need to be SGT members.

Mailbase is easy to use and electronic mail is all that is needed. Members join a list in the subject area and start receiving email from the list. If members wish to participate in discussions, they send a message to the list address. The message is then automatically sent out to all the list members, so everyone receives a copy of the message.

To join the Glass-Network list (you may want to pass this information on to other people), please send a message to: mailbase@mailbase.ac.uk with the message "join glass-network firstname lastname".

Mailbase will reply asking for confirmation, a procedure which verifies e-mail addresses and stops spamming. To send a message to everyone on the list, email: glass-network@mailbase.ac.uk. Remember, no attachments as they cannot be read by all participants. To leave the list, send an email to mailbase@mailbase.ac.uk with the message "leave glass-network".

Any problems, please contact the list owner, by sending a message to: glass-network-request@mailbase.ac.uk. ■

EIGHTH INTERNATIONAL CONFERENCE ON THE STRUCTURE OF NON-CRYSTALLINE MATERIALS, NCM8

The programme and abstracts from the Eighth International Conference on the Structure of Non-Crystalline Materials, held from 6 to 11 August 2000, will continue to be held on the SGT's website www.sgt.org/meetings/NCMprog.html. This will allow visitors to the site an opportunity to view all the papers and posters presented at the meeting. The proceedings of the meeting will be published in a forthcoming issue of the *Journal of Non-Crystalline Solids*. Abstracts from all past and future meetings will be posted on the site too.



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