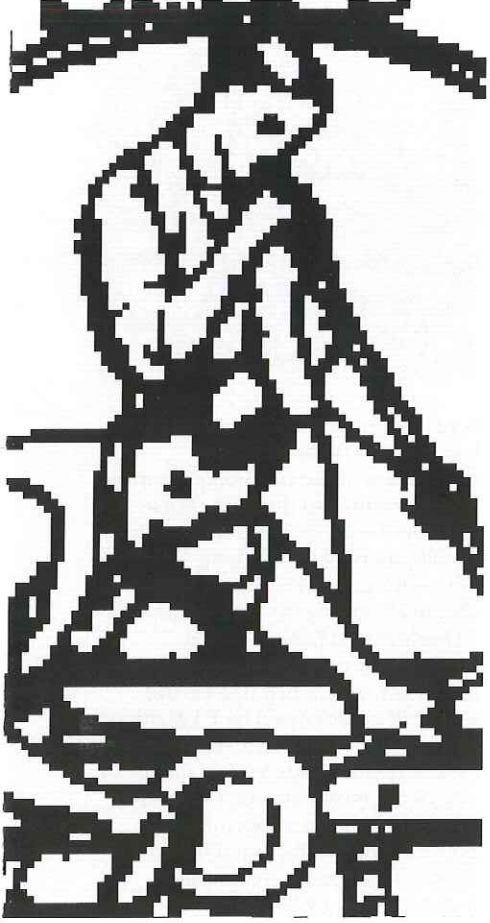


NO. 3 1999

SGT NEWS

Compiled and published by DMG Business Media Ltd on behalf of the Society of Glass Technology

GLASS OPPORTUNITIES - FROM FEEDER TO COLD END

The Society of Glass Technology's Spring Meeting on the challenges and opportunities from developments between the feeder and cold end will be held at Tankersley Manor Hotel, Barnsley from Wednesday 12 to Friday 14 May 1999. The programme has been finalised with only a few names of speakers to be confirmed. The conference will follow the same format as 1998 with factory visits and local section reception on Wednesday, a full day of papers on Thursday followed by the Society's annual general meeting and the conference dinner on the same evening.

The venue is based around a 17th Century building, with a brand new state of the art conference centre attached. Tankersley Manor is set in its own grounds and offers a pleasant and relaxed environment. The hotel is situated just off Junction 36 of the M1 along the A61 Sheffield Road. Nearby places of interest include Wentworth Castle and Gardens, The Earth Centre, Victoria Jubilee Museum, or if you wish to go further afield, there is the White Rose Shopping Centre in Leeds, as well as Meadowhall, or the new National Centre for Popular Music in Sheffield.

WEDNESDAY 12 MAY

Factory visits to Beatson Clark (Rotherham), Demaglass (Chesterfield) or PLM Redfearn (Barnsley) have been arranged for the Wednesday afternoon. Numbers will be strictly limited and places can only be guaranteed if booked in advance. In the evening, the Yorkshire Section will host the Local Section reception in the hotel.

THURSDAY 13 MAY

The meeting will begin with a keynote lecture from Professor H Hessenkemper. He will advance the principle that productivity is the initial key to success in the production strategies for high quality lightweight containers. For this to succeed, there needs to be a stabilisation of the production relevant parameters and improvement of the different processes. Examples of these aspects include viscosity controlled glass conditioning; the implementation of expert systems; stabilisation and improvement of machine cooling in the forming process; and the control of the redox and water of the melt. Another aspect is the use of steam instead of air in the final blow process, which enables machine speed to increase significantly.

The conference papers for the rest of the morning session include: Productivity by J H Edgington, which attempts to give a definition of productivity for the glass container industry, how it can be measured and the standards expected; Glassmate by a speaker from POCO (USA), which looks at the materials used for ware handling; Changes in the oxidation state of tin needed to produce bloom in clear and tinted float glass is presented by K F E Williams and J Greengrass of University of Liverpool and Pilkington Technology Management, respectively; Causes of variations in gob weight and how to control them by a speaker from British Glass, which presents case studies of

CONTINUED ►

MIDLANDS SECTION VISIT TO NIPPON ELECTRIC GLASS (UK) LTD

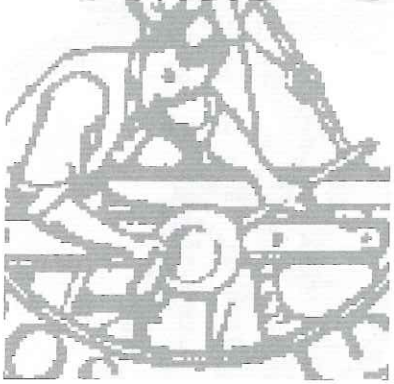
The Society of Glass Technology's Midlands Section organised a visit to Nippon Electric Glass in Cardiff, Wales on 11 March 1999. The party, which consisted of 33 members of both the Midlands and other sections, were welcomed to the plant by the managing director, Mr Matsumoto, and senior technical manager, Mr Matsumiya, and their staff. The group was then given a comprehensive tour of the plant which was completed in 1996, which included the glass manufacturing and finishing facilities.

The members were impressed by the state of the art equipment, which included an oxy-fuel fired melting furnace. The plant produces several tens of thousands of TV and computer monitor panels per day, dependent on type, and finishes funnels for cathode ray tube production, most of which is in the UK.

Nippon Electric Glass (UK) Ltd is a new member of the Society and it was particularly pleasing for older members to meet the new.

SUPPORT FOR STUDENTS

The Society of Glass Technology has fulfilled its commitment to support students studying glass technology with four donations of £500 each. W J Hayles, J C Walker, Claire Utton and Susan Morgan are the third year materials science students currently on a six month exchange visit to Alfred University from the University of Sheffield.



recent gob weight control installations and the practical experiences of users.

The afternoon session begins with a presentation looking at the properties and performance of PVD TiAlCrYCN coatings deposited on cast iron glass forming moulds by L A Donohue and W-D Munz of Sheffield Hallam University and M Roberts of British Glass. The authors report that seven days continuous production without the need for swabbing have been recorded. A speaker from Biebuyck will discuss machinery for a more productive industry. A review of the application of glass of coatings to glass containers - current practice and future trends is presented by A Kelsall of British Glass. Advances in moulds and materials by M Roberts of British Glass reports on the work being done in partnership with the UK Health and Safety Executive to eliminate the need for manual lubrication of glass forming moulds.

The Annual General Meeting will be held at 4.30pm on Thursday 13 May and the Conference Dinner will follow at 8.00pm later that evening.

FRIDAY 14 MAY

The final half day of the meeting will begin with a talk on workability and NNPB plunger wear by R Penlington of University of Northumbria. The examination of plungers of differing material characteristics has been combined with recent work on the deformation of glasses at high shear rates to put forward a new mechanism for plunger wear. Results have shown that workability and structure of the container glass now requires closer consideration by bottle makers. Annealing developments will be reviewed by a speaker from Antonini Fosco & Figli SRL. Cold end - beyond the bug, by D Pugh of Saint-Gobain, looks at what changes, excluding software with four digit date technology, we can expect in the cold end 'beyond the millennium bug': integrated management systems, advances in camera technology, automatic fault recognition and the non contact on line quality control multi inspection machine.

In a paper on chemical strengthening of glass products, A K Varshneya of Alfred University and W C LaCourse of Saxon Glass Technologies measure the progressive stress build up during ion exchange which shows that some beneficial surface compression is also lost due to a higher thermal contraction of the post-ion exchange surface relative to the bulk. These ideas are being incorporated in the development of an efficient, soda-lime-silica glass which can be chemically strengthened, for the US Department of Energy. Novel methods for coloration in the forehearth and afterwards on the glass will be discussed by P J Maitland of Ferro (GB). Different shapes, a look at the methods for forming glass, one of the most versatile materials available, and the opportunities it presents will be discussed by R A Smith of Demaglass Technology. Autoswabbing by L D Brown of Graphoidal looks at another method to reduce operator exposure to dangerous machinery and noise. After some closing remarks the conference will end around 1.00pm. ■

Society of Glass Technology,
3rd Floor,
Don Valley House,
Savile Street East,
Sheffield S4 7UQ.
Tel 0114 263 4455.
Fax 0114 263 4411.

THE BENEFITS OF MEMBERSHIP TO THE SOCIETY OF GLASS TECHNOLOGY

There are various levels of Society membership, each of which enjoy particular benefits.

Personal Members are part of a comprehensive international network of specialists in their particular field of glass. Members also have access to the wider range of knowledge encompassed by the SGT. This wide network operates through personal contact, meetings, workshops and publications. Personal membership grades are: students/concessionary/ under 25s, 25-29 years, 30 years and over, and retired.

Recognition is given to individual achievement. Fellowship of the Society is awarded to members who have reached prescribed levels of attainment in the business of glass and associated industries and for recognised contributions to the science and technology of glass. Fellows are entitled to use the designatory letters FSGT.

Collective Members: The technical and personal objectives of the Society bring direct benefits to industry and institutions associated with glassmaking. These organisations are encouraged to make a positive contribution to furthering the aims of the Society. A Collective nominates representatives of its company to benefit from the privileges enjoyed by a Personal Member.

Journal Patrons: The most frequent form of communication worldwide between members of the Society is through the publication of SGT News and the journals, Glass Technology and the Physics and Chemistry of Glasses. These publications are expensive to produce and distribute, and their costs account for the major part of the Society's income. Companies and institutions who become Journal Patrons provide invaluable support to further the Society's aims and objectives by contributing directly to publication costs.

In addition to the benefits of Personal Membership, both Journal Patrons and Collective Members receive additional copies of the Society's publications for distribution to employees and preferential rates for meetings and advertising.

PROFESSIONAL QUALIFICATIONS

In the UK, the Society supports the personal development of members to the status of Chartered Engineer. Through strategic links with other organisations the Society can help its members gain internationally recognised professional qualifications through its link with the Institute of Materials, which is a body incorporated in the UK by Royal Charter and registered with the Engineering Council.

CONTINUING PERSONAL AND PROFESSIONAL DEVELOPMENT

Anyone wanting to prove to future employers their willingness to pursue a professional approach to a fulfilling career will have to record their attendance and contribution across a wide spectrum of activities. The Society of Glass Technology is aiming to provide a record of personal and professional achievements for each individual member. The Membership Committee is developing a framework for the record keeping.

The Committee would welcome any member with a contribution to this debate or who would like to relate their experiences with other personal development issues. **Please contact David Moore at the Society (david@glass.demon.co.uk).** ■

SGT NEWS

GLASS FORUM BRINGS RESEARCHERS TOGETHER

The Third New Researchers' Forum on Glass took place at Warwick University on Tuesday 20 April 1999. Attendees had the opportunity to exchange views on the development of their research and mix with contemporaries from other research institutions. Seven oral presentations were spread throughout the day and six posters were on display during the breaks. Authors came from Aberdeen, Sheffield, Warwick, Reading, and Eye in the UK and Osaka, Japan.

The Basic Science and Technology Committee of the Society of Glass Technology established a new style of meeting. It was geared towards postgraduate students who have been working on glass and related materials for only a short time and gave them the opportunity to present progress reports on their research. Some of the presentations were made in front of an audience for the first time, while others were updates from previous meetings. The presentations took the form of talks and posters, with the objective of increasing awareness of the range of work going on in the UK in both glass and glass ceramics. It also encouraged greater interaction in the UK glass community and allowed researchers to network together. The meeting was organised by Dr Dianne Holland of the Department of Physics, Warwick University and Professor Adrian Wright of the J J Thomsom Physical Laboratory, University of Reading, the current chairman of the Basic Science and Technology Committee.

The first presentation of the day was on redox equilibria in glasses by Shirley Fong of the Department of Chemistry, University of Aberdeen. Spectroscopic measurements were made of the Fe^{3+} and Fe^{2+} states in phosphate glass systems with different modifier content. Optical basicity and the electron donor power of lead and thallium probes were used to gain an insight into the oxidation state of iron and the structure of the glass from the crosslinked network to the chain like structure and the reduction in length of these chains.

X-ray photon electron spectroscopy was used by Ian Gee of Warwick University to study the local chemical environment and structure of lead silicate glasses. The technique is surface specific and an ultra high vacuum was used to inhibit reactions on freshly exposed surfaces of the glass to gain a clearer insight into the probable bulk structure. It was proposed that the lead in the glass acts as an intermediate, between a glass former and modifier, so there are many different permutations of the structure. However, structural models and experiments suggest PbO does not act as a modifier.

The third and final paper of the first session was presented by Joanna Kinson, a teaching company doctorate associate of the University of Leeds who is working for Permastor, a manufacturer of enamelled steel storage tanks. The set up of her doctorate means that she is based with the Suffolk company and studies part-time for her PhD, which is an investigation of the interface between vitreous enamel and hot rolled steel sheets. The nature of the enamel is very complex and there is little current work to compare with, the most recent literature for reference typically comes from the 1960s. The multicomponent aluminosilicate enamel has many different phases and its interface with the high carbon steel is strong but very thin. The enamel fails before the interface because the adherence is not just mechanical and not just electrolytic. Phosphate rich phases and bubbles exist side by side in this complex system and work is being proposed to determine the formation mechanisms of the defects.

Following lunch, Liv Kukkonen of

CONTINUED ►

IN PRINT

The June issue of *Glass Technology* has papers on: Melting behaviour of the glasses in the SrO-MgO-ZrO_2-SiO_2 system; A new hypothesis for the pit formation on glass surfaces; and laser induced breakdown spectroscopy of hafnium doped vitrified glass.

The June issue of *Physics and Chemistry of Glasses* has papers on: DTA observation of phase transformation from cubic to tetragonal $PbTiO_3$ in quaternary glass system $PbO.B_2O_3.TiO_2.BaO$; Effects of salts on silicate glass dissolution in water: kinetics and mechanism of dissolution and surface cracking; EPR study of vanadyl ion in $CoO.MO.B_2O_3$ (M=Cd,Sr) glasses; structure of the Na_2S-GeS_2 sulphide glasses - comparison with the Na_2O-GeO_2 glasses; Oriented crystallisation of lithium niobate containing glass ceramic in an electric field and determination of the crystallographic orientation by infrared spectroscopy; High resolution solid state NMR studies of ionically conductive Li_2S-SiS_2-Li_2O-P_2O_5 oxysulphide glasses; Density of mixed alkali silicate glass; phase diagram estimation of the Al_2O_3-SiO_2-Gd_2O_3 system; Raman scattering in AgI-Ag_2O-P_2O_5 glasses; Local structures of Er^{3+} containing Ga_2S_3-GeS_2-LaS_3 glass; and The fluorescence and absorption spectra of rare earth metaphosphate glasses.

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

London
– Mr P West, United Glass Ltd, Porters Wood, St Albans, Herts AL3 6NY. Tel 01727 59261.

Midlands
– Mr C Baldwin, Stein Atkinson Stordy Ltd, Midland House, Ounsdale Road, Wombourne, Near Wolverhampton WV5 8BY. Tel 01902 324000.

North East
– Mr J Henderson, 44 Woodside Ave, Throckley, Newcastle upon Tyne NE15 9BE. Tel 0191 264 4775.

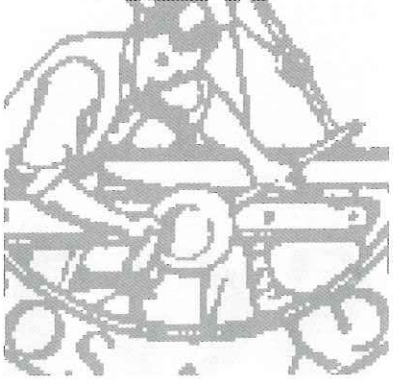
North West
– Dr D Martlew, Pilkington Technology Centre, Hall Lane, Lathom, Ormskirk, Lancs. Tel 01695 54210.

Scottish
– Mr D A Rennie, United Glass Ltd, Glasshouse Loan, Alloa FK20 1PD. Tel 01259 218822.

Yorkshire
– Miss R M Sales, 20 Blackbrook Drive, Sheffield S10 4LS. Tel 0114 2306179.

NORTH AMERICA
– Dr A G Clare, School of Ceramic Engineering and Sciences, New York State College of Ceramics at Alfred University, 2 Pine Street, Alfred, NY 4802-1296, USA. Tel 607 871 2392.

INDIA
– Dr J Mukerji, Central Glass and Ceramic Research Institute, PO Jadavpur University, Calcutta 777 032, India. Tel 473 3496.



the University of Sheffield described the early stages of research on transparent, rare earth doped oxyfluoride glass ceramics for photonics applications. The glass ceramic can use a 1.3mm optical window as a sensor or as a short efficient waveguide devices. The erbium doped cerammed glasses have only nanometre sized crystals which do not cause a high degree of scattering. Control of composition has led to control of the nucleation and crystallisation. With the right processing method the crystal size can be kept below a critical threshold. The researchers at Sheffield are developing an extrusion method which may have the answers.

Structure evolution with heating of TiO_2:SiO_2 sol-gels has been investigated by Graham Wallidge of Warwick University. These glasses can be used as ultra low expansion glasses, optical coatings, waveguides, can have tailored optical properties, or be used as a catalyst or catalyst support. The gel is made by adding titanium isopropoxide to hydrolysed tetraethylorthosilicate. The final glasses can contain between 8-41mol% TiO_2. Structural analysis studies show that the glasses are dehydrolysed with mainly bridging oxygens present. The structural coordination of titanium increases with temperature and there is significant phase separation.

Jonathan Roderick of Warwick University is looking at the radiation resistance of mixed alkali borosilicate glasses for high level vitrification of nuclear waste. The glasses used to immobilise nuclear wastes need to be durable for many thousands of years and resistant to ionising radiation from the fission products. The ionising alpha and beta particle and the ballistic interaction with the larger alpha particles will lead to a high temperature in the glass over the first 1000 years. Changes to the type of nuclear generator mean the nature of the waste being produced is expected to change over the next 20 years so the glass composition needs to be adaptive to these demands and research is working towards these new criteria. Birmingham University has carried out a limited number of experiments using the cyclotron and high energy and high velocity particle interactions have been simulated.

After a short break, the final paper of the day by Steve Ison of Warwick University looked at the interfacial reactions between glass and metal matrix composites. An aerospace materials company looking at the application of silicon carbide reinforced aluminium composites in avionics systems supports the work. A lead borosilicate glass is being investigated as a suitable interlayer between the surface mounted electronic components and the composite. The glass provides good wetting and provides a good thermal expansion match and chemical and mechanical bonding between the component and composite. Bubbles and metallic lead form within the glass, the lead then floats to the surface of the glass even though it is denser. The cause of these phenomena is probably the oxidation of the silicon carbide. Pure aluminium substrates feature fewer bubbles and less free lead. There is plenty of work required to pin down the complex reduction and oxidation reactions taking place.

The posters at the meeting were: *Ionic mobility in field assisted ion exchange* by Mei Hui Wu of the University of Aberdeen; *Towards monomode proportioned fibre optic preforms by extrusion* by David Furniss of the University of Sheffield; *Super water repellent coating films by the sol-gel method* by K. Tadanaga of Osaka Prefecture University, Japan; *NASIGLAS structure and properties* by Anuson Niyompan of Warwick University; *Inorganic membranes via sol-gel processing* by Geoff Diamond and Geoff West of Warwick University; and *Ferroelectric glass-ceramics from the bismuth germanate system* by Kamonpang Pengpat of Warwick University. ■

EMAIL ADDRESSES

As well as the general email address, sgt@glass.demon.co.uk, all members of staff at the Society of Glass Technology can now be contacted directly by e-mail.
Christine@glass.demon.co.uk for subscriptions and accounts information;
Sara@glass.demon.co.uk for membership and meetings information;
Jenny@glass.demon.co.uk for editorial and journals information;
Jill@glass.demon.co.uk for meetings and membership information;
David@glass.demon.co.uk for editorial information, submissions to SGT News and general information.

Compiled and published by DMG Business Media Ltd on behalf of the Society of Glass Technology

UK IRELAND SOL-GEL GROUP MEETING

Following the successful UK-Ireland Sol-Gel Group meeting held at Imperial College, London in April 1998, the next meeting has been scheduled at Loughborough University on 14 and 15 June 1999, with Dr Simon Hodgson as the host.

Following the format of the previous meetings, a poster session and informal reception on the evening of the 14 June will be followed by a full day of talks and a further poster session on the 15 June. As at previous meetings the intention is to provide an opportunity for sharing ideas, and generally building and strengthening the sol-gel community by familiarisation with each other and work, and perhaps identifying fruitful areas for possible formal or informal collaboration.

Talks and posters might comprise descriptions of the activities of research groups or workers, presentations of preliminary results and/or new work, or provide an opportunity for postgraduate students to present their work.

The Society of Glass Technology has agreed to help with the organisation of the meeting and by hosting the event within the Institute of Polymer Technology and Materials Engineering it is expected to keep the registration fee to around £25 including lunch and the reception. It is hoped that this will encourage the maximum possible attendance by both academics and research students at the event.

Further information can be obtained from Sara Lindley, Society of Glass Technology, Don Valley House, Savile Street East, Sheffield S4 7UQ, UK. Tel 0114 263 4455. Fax 0114 2634411. E-mail sara@glass.demon.co.uk