INTERNATIONAL YEAR OF GLASS 2022

12th China Functional Glass Symposium
and International Forum on New Optoelectronic Materials

12TH CFGS & IFNOM

第十二届中国功能玻璃学术研讨会暨新型光电子材料国际论坛

Program and Abstracts

Specialty Glass Division of the Chinese Ceramic Society
Shanghai Institute of Optics and Fine Mechanics,
Chinese Academy of Sciences
Qilu University of Technology

August 19-20, 2022

12th China Functional Glass Symposium and International Forum on New Optoelectronic Materials

On May 18, 2021 the United Nations General Assembly approved the resolution to declare the year 2022 "The International Year of Glass". This is the first time that UN has given such a recognition to a specific material and celebrate the vital role that glass has played and will continue to play in the advancement of human society. This symposium is one of a series of important events in China to celebrate the International Year of Glass.

Presentation form: Online via Tencent Meeting

Conference Link:

Plenary Talks, Tencent Meeting ID: 551-985-206

Meeting link: https://meeting.tencent.com/dw/2A81DbVZajQP

Session 1 (Fundamental glass research, functional glass and applications)

Tencent Meeting ID: 688-748-579

Meeting link: https://meeting.tencent.com/dw/PAR29O0cXBI1

Session 2 (Optical functional glass and optical fiber)

Tencent Meeting ID: 487-503-302

Meeting link: https://meeting.tencent.com/dw/rZ535TCan7kY

12th China Functional Glass Symposium and International Forum on New Optoelectronic Materials

Symposium Program

Date	Activities	Time	Speakers	Title	Chairs
August 19, 2022	Opening Ceremony	8:30~9:00	**Ruiping Gao**, President of the Chinese Ceramic Society **Yinglong Wang**, President of Qilu University of Technology **Long Zhang**, Vice Director of Shanghai Institute of Optics and Fine Mechanics **Lili Hu**, Chair of the Specialty Glass Division of the Chinese Ceramic Society		Jianrong Qiu
	Plenary Talks	9:00~9:30	Edgar Dutra Zanotto	Inorganic glass education and research in China and the world	Jianrong Qiu
		9:30~10:00	Shou Peng	Frontier and trend of functional development of novel glass materials	
		10:00~10:30	Hong Li	Development of new fiber glass for high-frequency communication	
		10:30~11:00	Jincheng Du	Discovery of novel functional glasses through computer simulations and artificial intelligence	
		11:00~11:30	Kohei Kadono	Recent developments of moldable chalcogenide glasses for infrared optics	Lili Hu
		11:30~12:00	Ping Jin	Smart coatings on glass for energy saving	
		12:00~12:30	Shibin Jiang	Status and future of photonic glasses and optical fibers	
		13:30~14:00	Weihua Wang	Research progress of metallic glasses and lunar glasses	Yuanzheng Yue
		14:00~14:30	Jianrong Qiu	Development of novel glass techniques	
		14:30~15:00	Xianghua Zhang	Recent research activities on chalcogenide glasses at university of Rennes	
		15:00~15:30	Matthias Wutting	Crystallization and vitrification kinetics by design: the role of chemical bonding	
		15:30~16:00	Yuanzheng Yue	Heterogeneity in glass	Zhongmin Yang
		16:00~16:30	Shifeng Zhou	Photonic glass and fiber for detection application	
		16:30~17:00	Chao Liu	Controlled precipitation of cesium lead halide perovskite nanocrystals in glass and their application	
		17:00~17:30	Pengfei Wang	Recent research progress on fluoride glass based fibre lasers and fibre amplifiers at ALL of HEU	
		17:30~18:00	Qinghui Li	Recent advances in the research on ancient Chinese glass	

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Invited Talks

Session	Date	Time	Speaker	Title	Chairman
Functional glass and applications	August 19, 2022	19:30~19:50	Lianjun Wang	Fabrication of glass - ceramics by sintering process from high-energy powders	Huidan Zeng
		19:50~20:10	Guohua Chen	Multi-ratio optical thermometry and energy storage characteristics of $Yb^{3+}/Er^{3+}/Tm^{3+}$ doped $BaNb_2O_6$ transparent glass-ceramics	
		20:10~20:30	Xin Wang	Research progress of laser glasses	
		20:30~20:50	Qiming Liu	High performance copper nanowire transparent conductive film and its non-enzymatic glucose sensor	
	August 20, 2022	9:00~9:20	Dezhi Tan	Photonic glass: structure manipulation and applications	Huixing Lin
		9:20~9:40	Pengfei Wang	Radiation resistant optical glasses for space and nuclear radiation protection	
		9:40~10:00	Liyan Zhang	Application of structural gene modeling in the establishment of a database for HLW solidification glass	
		10:00~10:20	Ping Lu	Study on crystallization mechanism of high strength transparent nano glass ceramics	
		10:20~10:40	Bo Fan	Liquid-phase synthesis of Li_2S-P_2S_5 glass-ceramic nano particles	Haitao Guo
		10:40~11:00	Yong Liu	Data driven modeling of glass hardness	
		11:00~11:20	Qiuju Zheng	Water resistance of borosilicate pharmaceutical glasses	
		11:20~11:40	Huidan Zeng	Glass for 5G communication	
		11:40~12:00	Ying Tian	Study on structural relaxation, fragility and optical properties of fluorophosphate glass	
Fundamental glass research		14:00~14:20	Limin Wang	The composition design of glassy materials: shifting from temperature-based to entropy-based strategies	Lina Hu
		14:20~14:40	Yanfei Zhang	Enhancing the electrochemical performances of glass anode for lithium ion batteries via disorder-order engineering	
		14:40~15:00	Ang Qiao	Correlation between microstructure and glass transition behavior in MOF glass	
		15:00~15:20	Lu Deng	A molecular dynamics simulation based study on the relationship between glass structure and their chemical durablility	
		15:20~15:40	Lina Hu	Heredity of dynamic properties of metallic glass forming liquid in amorphous solids	Limin Wang
		15:40~16:00	Shujiang Liu	Phase - separation and its effect on crack behavior of glasses	
		16:00~16:20	Xusheng Qiao	Spectral conversion glass and glass-ceramics	
		16:20~16:40	Jinjun Ren	Structural study on rare earth doped phosphate glasses by solid state NMR and XPS spectroscopies	
		16:40~17:00	Neng Li	The pressure-induced deformation and amorphization in zeolitic imidazolate frameworks and zeolites	

12th China Functional Glass Symposium and International Forum on New Optoelectronic Materials

Session	Date	Time	Speaker	Title	Chairman
Optical functional glass	August 19, 2022	19:30~19:50	Yuan Gao	Amplified up-conversion luminescence via plasmonic lattice mode	Shiquan Liu
		19:50~20:10	Xiaofeng Liu	Near-infrared CW laser driven nonlinear white light emission in graphene, oxide phosphors, and porous glass	
		20:10~20:30	Zhousu Xu	Preparation and optimization of optical properties of $CsPbX_3$ perovskite quantum dot-doped glass	
		20:30~20:50	Zhengwen Yang	Reversible regulation of luminescence properties of rare earth ion-doped glass based on photochromic effect and its application in three-dimensional optical storage	
	August 20, 2022	9:00~9:20	Daqin Chen	Highly stable perovskite quantum dots for displays	Jianbei Qiu
		9:20~9:40	Jing Ren	Nano-glass composite scintillators: opportunities and challenges	
		9:40~10:00	Xuhui Xu	Optical properties and application of rare earth doped glass-ceramics	
		10:00~10:20	Hang Lin	Phosphor-in-glass film for laser-driven lightings/displays	
		10:20~10:40	Guoying Zhao	Applied fundamental research from phosphor to quantum dot for solid state lighting and display	
		10:40~11:00	Zhiguo Xia	Design of inorganic near infared luminescence materials based on crystal structure engineering	Lianjun Wang
		11:00~11:20	Gongxun Bai	Rare earth doped optical functional materials and applications of some photonic glasses	
		11:20~11:40	Yinsheng Xu	Tb doped magneto-optical borogermanate glasses	
		11:40~12:00	Shiquan Liu	Preparation of porous photo-catalysts starting from titanium phosphate glasses	
Optical fiber		14:00~14:20	Guangming Tao	Multimaterial infrared fibers for medical fiberbots	Haizheng Tao
		14:20~14:40	Chunlei Yu	Development and applications of multi band high power active silica fiber	
		14:40~15:00	Guoping Dong	Laser-induced formation and optical properties of quantum dots in transparent materials	
		15:00~15:20	Xunsi Wang	Research on fabricating technology and defect-eliminating mechanism of Infrared glass fiber	
		15:20~15:40	Yiguang Jiang	Research on preparation and properties of MIR fluoride fibers	
		15:40~16:00	Haitao Guo	Study on chalcogenide negative curvature anti-resonant fiber	Shixun Dai
		16:00~16:20	Chengzhen Liu	Mid-infrared luminescence properties of rare earth doped TeO_2-BaF_2-LaF_3-La_2O_3 fluorotellurite glass fibe	
		16:20~16:40	Jianxiang Wen	Characteristics of crystal derived fiber and its application in single frequency laser	
		16:40~17:00	Minghui Zhang	Study on preparation and properties of novel near-mid-infrared oxide glasses	
		17:00~17:20	Changgui Lin	New research trends of chalcogenide glasses	

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Abstracts & Biography of Plenary Speakers

Specialty Glass Division of the Chinese Ceramic Society
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Inorganic glass education and research in China and the world

Edgar Dutra Zanotto

Center for Research, Technology and Education in Vitreous Materials (CeRTEV)Universidade Federal de São Carlos, UFSCar,
e-mail: dedz@ufscar.br

Abstract:
Inorganic glasses have numerous ordinary domestic uses and countless high-tech applications. Furthermore, through controlled crystallization, sophisticated polycrystalline glass-ceramics can be produced, which are used, for example, in cooktop plates, giant telescopic mirrors, dental prostheses, and state-of-the-art cell phone displays. For the comfort glasses provide to our lives and their economic importance, 2022 was chosen by the United Nations as the *International Year of Glass*. In this talk, we will start with the history of glass education and research, including the large pioneering groups in Jena, Alfred, Sheffield, and Leningrad (St. Petersburg), which started in the late 1800s and early 1900s. We will also show the names of prolific glass researchers in China and other leading (glass) countries. Then we will cover glass education developments throughout 2021 with statistics about the vital role of formal academic courses (passive learning) and research projects (active learning) as the building blocks for training skilled engineers and researchers. Finally, we will present statistics about the pace of international glass research as measured by scientific papers and patents.

Biography

Edgar D. Zanotto has been a materials science and engineering professor at the Federal University of São Carlos, Brazil, for 45 years. His work focuses on fundamental and applied research on dynamic processes and properties of glasses and glass-ceramics. He has published circa 400 scientific articles and 30 book chapters and filled approximately 30 patents. He is an editor of the *Journal of Non-Crystalline Solids* and an advisory board member of nine other materials and physics journals. Prof. Zanotto is a Fellow of 5 science academies, including the Brazilian Academy of Sciences, The World Academy of Sciences (TWAS) and the World Academy of Ceramics.

Frontier and trend of functional development of novel glass materials

Peng Shou

Academician of the Chinese Academy of Engineering
Chief Engineer of China National Building Material Group Co., Ltd.
Board chairman of China Triumph International Engineering Co., Ltd.
Director of National Innovation Center of Glass New Materials.

Abstract:
The functional development of materials has become a key technological direction to safeguard national security and strategic interests, providing a variety of options for the application scenarios of materials. With the accelerated improvement of component system, process and technology, novel glass materials have become important functional materials in multiple application fields such as information display, new energy, biomedicine, aerospace, deep-sea exploration, polar exploration, national defense and military industry, playing an irreplaceable key role in the national strategic field.

Biography

Prof. Peng Shou, academician of the Chinese Academy of Engineering (CAE), expert of glass new materials, the 23rd President of the International Commission on Glass (ICG), assumed many important roles, including member of Expert Committee of National Industrial Base, national master of engineering survey and design. He is also chief engineer of China National Building Material Group Co., Ltd., board chairman of China Triumph International Engineering Co., Ltd., director of National Innovation Center of Glass New Materials, director of National Key Laboratory of Advanced Technology for Float Glass, chair of the Advisory Committee of ICG, vice chairman of the Chinese Ceramic Society,and vice chairman of the BeiJing Association for Science and Technology. In addition, he is a representative of the 17th National Congress of the Communist Party of China and deputy to the 12th and 13th National People's Congress.

Prof. Peng Shou has committed himself to the front line of the research, design and industrialization of glass new materials for as long as 40 years. To meet the demands of major national strategies, he developed the world-class 30μm flexible ultra-thin glass (UTG), the first high-generation TFT-LCD glass substrate independently developed in China, the first Chinese neutral borosilicate glass tubing for vaccines, the CIGS power generation glass with the highest efficiency in the world, and serials of glass new materials. He presided over the construction of the National Innovation Center of Glass New Materials Manufacturing and led the Chinese glass new materials into the top ranks of the world both in terms of glass science and technology and industry. He has been awarded 3 second prizes of National Science and Technology Progress Award and 6 first prizes of provincial-level science and technology awards, both as the first accomplisher. He is also a laureate to many weighty honors, including Lifetime Achievement Award of ICG, Guanghua Engineering Science and Technology Award, Medal of Leadership in Advancement of Ceramic Technology of the American Ceramic Society, Ho Leung Ho Lee Foundation Science and Technology Innovation Award, the 3rd Role Model of the State-Owned Enterprises etc. Under his leadership, his team won the first Shi Changxu New Materials Technology Award and the Chinese Industrial Award.

Development of New Fiber Glass for High-Frequency Communication

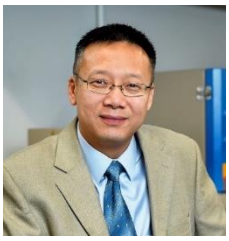
Hong Li

Fiber Glass Research and Development Center
Nippon Electric Glass, USA

Abstract:
The presentation briefly reviews the state of low-dielectric fiber glass development for high performance PCB applications. Discussions will focus on glass chemistry, properties, batch-to-melt conversion, and statistical modeling in glass composition design for multiple target properties.

Biography:

Dr. Hong Li is Senior Scientist at Nippon Electric Glass (NEG), USA. He has more than 20 years of combined experiences in fiber glass research and development with PPG Industries and NEG (US). Dr. Li is Fellow of the American Ceramic Society (ACerS) and the recipient of lifetime member of PPG Collegium, the highest professional award from PPG. He was a chair of GOMD (ACerS) and council member (2010-2021) of International Commission on Glass (ICG). Dr. Li has more than 100 patents and patent applications worldwide and authored/co-authored more than 100 scientific publications. Recently Dr. Li has served as an editor-in-chief of "Fiberglass Science and Technology: Chemistry, Processing, Characterization, Applications and Sustainability," (Springer, 2021). Currently Dr. Li serves as a vice chair of TC 28 (fiberglass) under ICG.



Discovery of novel functional glasses through computer simulations and artificial intelligence

Jincheng Du

Center for Advanced Scientific Computing and Modeling & Department of Materials Science and Engineering, University of North Texas, Denton, Texas, USA

Abstract:
Glass is one of the most complex materials, with glass structure and glass transition remaining the unresolved fundamental physical problems. Together with theory and experiment, computer simulations, ranging from atomistic modeling to artificial intelligence, have greatly contributed to the recent advances in understanding of glassy state, predicting glass properties, and designing of new glass composition. These advances are due to repaid increase of computing power, active development and maturing of simulation methods and algorithms, as well as ever expanding user groups and practitioners. In this talk, I will provide an overview of these advances and present a few practical examples based on results of our group: from phase separation in oxyfluoride glasses based on classical molecular dynamics simulations, structure of chalcogenide glasses from *ab initio* molecular dynamics simulations, and structure-property correlation in borosilicate glasses through machine learning approaches.

Biography

Bio: Dr. Jincheng Du is a professor of materials science and engineering at UNT. His research is in the field multiscale simulations of materials, with a focus on atomistic simulations, structure-property relation, corrosion and environment interactions of glass materials. He has published 2 books and over 200 peer reviewed papers in journals including Nature, Nature Materials, Chemical Review, Physical Review Letter etc. As one of the leading experts in his field, he has given over 100 invited talks and seminars in international conferences and at universities around the world. Prof. Du currently serves as the Chair of TC27 atomistic modeling of International Commission of Glass (ICG) and Editor of the Journal of the American Ceramic Society. He is the past chair of the Glass and Optical Materials Division of the American Ceramic Society. Among other distinctions, he is an elected Fellow of the American Ceramic Society and American Society of Materials. He is also the recipient of Research Leadership Award of UNT, Fulbright US Scholar Award, Gordon Fulcher Distinguished Scholar of Corning Inc., and the W.E.S Turner Award of ICG.

Recent developments of moldable chalcogenide glasses for infrared optics

Kohei Kadono

Faculty of Materials Science and Engineering,Kyoto Institute of Technology,Kyoto, Japan

Abstract:
It has been more than 150 years since the first discovery of chalcogenide glass. Chalcogenide glass has been of interest because of its remarkable photoinduced effect, high optical non-linearity, and so on. It has been extensively studied since the 1950s. The applications to infrared optical elements that utilize the superior infrared transparency of chalcogenide glass are also one of the research interests. In particular, since 2000, the chalcogenide glasses have received attention as a glass material applicable to high-quality and price-competitive infrared optical elements, such as lenses. Here, we introduce the recent research development on chalcogenide glass that can be applied to infrared optics manufactured by molding.

Biography:

Dr. Kohei Kadono started his research on glass science and technology in 1986 at Osaka National Research Institute that has been reorganized to National Institute of Advanced Industrial Science and Technology (AIST) in 2001. He moved to Kyoto Institute of Technology in 2006 and is now a Professor of Faculty of Materials Science and Engineering. Recent his research interests are infrared-transmitting chalcogenide glasses, radiation effects on oxide glasses and its applications, preparation of porous silica glass and its reduction to porous silicon, and so on.

Smart coatings on glass for energy saving

Kanehira Minoru (Ping JIN)

Shanghai Institute of Ceramics, CAS, China

Abstract:

Global warming is posing a huge challenge to human beings. Excessive carbon emission is the fundamental cause of global warming, whereas energy saving and carbon reduction are the main ways to deal with the problem. Recently, the national "Double-carbon strategy" points out the direction for R & D of China, bringing new opportunities to spacial glass. The construction and automobile industries are well-known huge carbon emissions consumers, and coated glass are important ways to energy saving. The market keeps increasing, expecting to form a huge market of several hundred billion yuan. After decades of development, energy-saving glass has formed a mature market. However, the current glass for energy-saving is still limited in static selection of light and heat transfer, and can't be dynamically adjusted according to the environment or human demand. The new glass is smart with dynamic photothermal regulation function is the next generation product. In addition, more comfort and even decorative effect are increasingly valued. The speaker will introduce the state-of-art and prospect of smart glass, in combination with the newest research results of the group.

Biography:

Kanehira Minoru (Ping JIN) is currently a Researcher/National Expert of Shanghai Institute of Ceramics (SIC), CAS, China. He obtained the Doctor Degree in 1992 in Nagoya Institute of Technology, Japan, and entered the AIST Japan as a Senior Research Scientist the same year. He became a tenured professor of AIST in 1998. He was the director of the research center of SIC during 2009-2020. He has been engaged in research on smart glass since 1992, with over 300 papers in Energy and Environ. Sci.、Nano Energy，Nat. Electron., ect., and 170 patents in the related fields. The numbers of papers/patents on thermochromic materials once ranked first in Japan and the world.

Status and Future of Photonic Glasses and Optical Fibers

Shibin Jiang

AdValue Photonics Inc, Tucson, Arizona, USA
Hangzhou Silverlake Laser Technology, Hangzhou, Zhejiang, China

Abstract:
Current status of glasses for photonics and optical fibers, especially rare-earth doped glasses and fibers will be briefly summarized. Some specific applications will be presented and their significant impacts on the advancement of the society will be described. Potential prospects for glasses and fibers for photonic applications will be discussed.

Biography:

Dr. Shibin Jiang is founder and chairman of the board of AdValue Photonics Inc. and Adjunct Research Professor at College of Optical Sciences, University of Arizona. His research activities generated more than a dozen of the world's first commercial products, which are widely used in the world. Dr. Jiang holds 86 issued patents, edited 36 proceeding books, and authored more than 150 publications. He served as chairs of 48 conferences including OPTO at Photonics West for SPIE and Advanced Solid-State Laser Congress for Optica. He served as many award committees for OSA, SPIE and The America Ceramic Society (ACerS), and associate editors for 4 scientific journals. He was the chair for Glass and Optical Materials Division of ACerS in 2014. He currently serves as the chair of technical committee of photonics glasses and optical fibers of ICG. In 2021 he was elected as Board of Directors of ACerS.
Dr. Jiang was awarded with the Gottardi Prize in 2005 from ICG, 2012 and 2014 R&D 100 Awards, and 2018 R&D 100 Award Finalist. He received the Corporate Technical Achievement Award in 2018, the Global Ambassador in 2019, and the Medal for Leadership in the Advancement of Ceramic Technology in 2021 from the ACerS. Dr. Jiang is elected as Fellow of SPIE in 2005, Fellow of ACerS in 2008, Fellow of Optica in 2011, and an academician of the World Academy of Ceramics in 2020.

Research progress of metallic glasses and lunar glasses

Weihua Wang

Institute of Physics, Chinese Academy of Sciences, China
Songshan Lake Materials Laboratory, China

Abstract:
Metallic glass exhibits unique physical, mechanical, and chemical properties, as well as ultra-high stability, and has many applications in aerospace, information, energy, and other fields. The lunar soil brought back by Chang'e 5 contains 30-50% glass, which was formed due to the early volcanic eruptions of the moon, or the impact of asteroids and meteorites. Under the harsh environment such as the temperature difference between day and night of hundreds of degrees on the moon, the strong solar wind, and the irradiation of high-energy cosmic rays, these glasses have existed stably for hundreds of millions of years. This magical super-stability of lunar glass makes it like amber on the earth, which can preserve a lot of geological and environmental information of the moon in ancient times, providing important evidence that the moon once had water and atmosphere in ancient times. Both metallic glass and lunar glass are model systems for studying the structural characteristics, formation principles, energy dissipation mechanisms, and physical and mechanical properties of amorphous materials. In my talk, I will introduce and discuss the latest progress of metallic glass materials and its connection to other scientific and application fields. I also present recent important results about the formation and characteristics of lunar glass, and the significance and application value of lunar glass research.

Biography:
Weihua Wang is Academician of the Chinese Academy of Sciences, Academician of the World Academy of Sciences, Fellow of the American Physical Society, Professor of the Institute of Physics, Chinese Academy of Sciences, Director of the Key Laboratory of Extreme Conditions Physics, Chinese Academy of Sciences, Director of the Songshan Lake Materials Laboratory, and Chief Scientist of the Beijing Materials Genome Platform. He has been engaged in the basic and applied research of amorphous materials for a long time. He has won the 2nd-class prize of the National Science and Technology Progress Award, the 2nd-class prize of the National Invention Award, the Zhou Peiyuan Physics Award, the 2nd-class prize of the National Natural Science Award, the 2017 International Outstanding Scientist Award in the Field of Metastable Materials, and the National Innovation Award. He is ESI Global Highly Cited Scientist for many times.

Development of novel glass techniques

Jianrong Qiu

State Key Laboratory of Modern Optical Instrumentation
Zhejiang University, China

Abstract:
The progress of glass science and technology relies on the development of various characterization and manufacturing techniques of glass. We are developing new techniques which can fully utilize the features of glass materials. 3D modification of transparent glass microstructures by using focused fs laser is a powerful technique and can realize various novel and multi-functions for glass. In this talk, I will introduce some results about phenomena and mechanisms of the fs laser induced microstructures, and their promising applications in optical data storage, micro-LED array and color computed hologram.

Biography:
Dr. Jianrong Qiu is Professor of Zhejiang University, China. He is fellow of the Optical Society of America, the American Ceramic Society and academician of the World Academy of Ceramics. His research focuses on glasses and fibers, laser interaction with glass. He has published over 500 papers in peer-refereed journals including Science, Nature Photonics, Nature Commun., Adv Mater, PRL, JACS etc. He has delivered over 200 invited talks at conferences. He received Otto-Schott Research Award from the Abbe Fund, Germany and G. W. Morey Award from the American Ceramics Society.

Recent research activities on chalcogenide glasses at university of Rennes

Xianghua Zhang

Laboratory of glasses and ceramics, Institute of chemical science
University of Rennes – CNRS, 35042 Rennes, France

Abstract:
The laboratory of glasses and ceramics at University of Rennes works actively on chalcogenide glasses with basic research on the structure-properties relationship and applied research for developing different applications. During the last years, research activities include high refractive index glass for future autonomous vehicle, infrared optics with gradient refractive index, innovative fabrication and shaping methods for chalcogenide based infrared components, chalcogenide thin film for energy storage and conversion. A review of recently published results will be given during this talk.

Biography:
ZHANG Xianghua is Research Professor of the French CNRS (National center for scientific research). He is the director of the laboratory of glasses and ceramics with 41 permanents staffs and about 20 PhD students and post-docs. This laboratory is part of the Institute of Chemical science of Rennes, a joint CNRS-University of Rennes research unity. He is co-author of more than 400 publications, 21 groups of patents and has given about 100 invited talks in international conferences. He has been mainly involved in chalcogenide glasses for infrared photonics since more than three decades and more recently also in chalcogenide materials for energy storage and conversion.

Crystallization and Vitrification Kinetics by Design: The Role of Chemical Bonding

Matthias Wuttig

Department of Physics, Aachen University, Germany

Abstract:
Controlling a state of material between its crystalline and glassy phase has fostered many real-world applications. Nevertheless, design rules for crystallization and vitrification kinetics still lack predictive power. Here, we identify stoichiometry trends for these processes in phase change materials which are emerging materials for data storage, neuromorphic computing and photonic switches. The stoichiometry dependence is correlated with material properties, such as the optical properties of the materials. A quantum-chemical map explains these trends and provides a blueprint to design crystallization kinetics.

Biography:
Dr. Matthias Wuttig is Chair of Physics of Novel Materials at RWTH Aachen University, Germany. He is Fellow of the Materials Research Society. His research focuses on novel design routes for functional materials. He has published over 400 papers in peer-refereed journals with over 35.000 citations and has received several awards including an ERC Advanced Grant.

Heterogeneity in glass

Yuanzheng Yue

Department of Chemistry and Bioscience
Aalborg University, Denmark

Abstract:
A supercooled liquid is dynamically and structurally heterogeneous. Its heterogeneous structure can be frozen-in in glass state upon quenching. However, the challenging questions are: 1) How can the structural heterogeneity be detected and quantified? 2) Why does it exist? 3) How does it affect enthalpy relaxation, properties, and functionalities in glass? In this talk, I will provide some insights into these questions by means of thermal, dynamical, microstructural, and optical tools.

Biography:
Dr. Yuanzheng Yue is Professor of Chemistry at Aalborg University, Denmark. He is Fellow of European Academy of Sciences and Fellow of Royal Society of Chemistry. His research focuses on glass science and technology, and functional amorphous materials. He has published over 350 papers in peer-refereed journals including Nature, Science, PNAS, PRL, JACS, Chem Rev etc. He has delivered over 130 invited talks at conferences. He is a council member of the International Commission on Glass (ICG), the founding chair of the ICG Technical Committee for Glass Fibers and a member of Coordinating Technical Committee (CTC) of ICG.

Photonic glass and fiber for detection application

Shifeng Zhou

School of Materials Science and Engineering
South China University of Technology, China

Abstract:
Multicomponent glasses and fibers are considered to be the fundamental building blocks of the next-generation photonics. In this talk, the recent progress in designs, fabrications and applications of selected materials for multicomponent optical glasses and fibers is introduced. The results about the relation between the glass microstructure and its optical properties are introduced. The glasses and fibers with various detection functions, including high-energy radiation, neural electrical signal and ultra-short optical pulse are highlighted.

Biography:
Dr. Shifeng Zhou is Professor of Materials Science and Engineering at South China University of Technology. His primary research area is photonic glass and fiber. He has published over 150 papers in peer-reviewed journals. He is the recipient of the Gottardi Award of the International Commission on Glass and the Motoharu Kurata Award of the Ceramic Society of Japan. He is the committee member of the TC07: Crystallization & GCs (International Commission on Glass), and the Deputy Editor of Chin. Opt. Lett..

Controlled precipitation of cesium lead halide perovskite nanocrystals in glass and their application

Chao Liu

State Key Laboratory of Silicate Materials for Architectures,
Wuhan University of Technology, Wuhan

Abstract:
Cesium lead halide ($CsPbX_3$, X=Cl, Br, I) perovskite nanocrystals have found important applications in solar cells, light-emitting diodes, detectors, scintillation. Precipitation of $CsPbX_3$ perovskite nanocrystals into glass matrix can significantly improve their chemical stabilities and photo-stabilities, and understanding the precipitation mechanisms of $CsPbX_3$ perovskite nanocrystals in glasses is important to promote their applications towards light-emitting diodes and photo-detection. In this talk, recent progress on the controlled precipitation of $CsPbX_3$ perovskite nanocrystals in glass based on liquid phase separation, ion-exchange, and pulse laser irradiation will be introduced, and some examples on the light-emitting diodes will be illustrated.

Biography:

Prof. Chao Liu is a researcher in State Key Laboratory of Silicate Materials for Architecture in Wuhan University of Technology. His research focuses on semiconductor nanocrystals embedded glasses, functional glass-ceramics and processing. He has published more than 130 papers in peer-reviewed journals and delivered more than 30 invited talks at conferences. He is currently serving as director of the Specialty Glass Engineering Technology Research Center and committee member of ICG-TC23.

Recent research progress on fluoride glass based fibre lasers and fibre amplifiers at ALL of HEU

Pengfei Wang

Key Lab of In-Fibre Integrated Optics, Ministry of Education of China,
Harbin Engineering University, Harbin 150001, China
Email: pengfei.wang@tudublin.ie

Abstract:
In recent decades, gain glass materials with ultra-broadband emission have been intensely investigated due to their various invaluable applications, such as broadband fibre amplifiers and tunable fibre lasers. In comparison to silica glass, the doping concentrations of rare-earth ions in fluoride glasses, can be much higher and the melting temperatures are much lower. In addition, the gain coefficients of rare-earth ions in fluoride glasses are higher than in silica glass due to their low multiphonon relaxation rates. Therefore, rare-earth doped fluoride glass is a promising matrix for lasing and amplifier applications. Mid-infrared fibre lasers have extensive application prospects in the domains of chemical and biomedical sensing, military applications, materials processing, and other scientific research purposes. The development of fibre lasers emitting in the mid-infrared wavelength region is still a growing field of photonics that has already demonstrated many successes, but still faces a number of significant challenges, for example, the realization of fibre lasers capable of emitting beyond 4 μm is a really significant challenge. The developed fibre amplifier technology offers comparable key advantages over semiconductor optical amplifiers (SOAs) when used for boosting communication signals. However, distortion effects typically associated with the saturation mechanism and gain dynamics of SOAs do not exist in a number of telecommunication bands, such as O- and S-band, therefore praseodymium-doped and thulium-doped fiber amplifiers, are capable of leading to improved compatibility with wavelength division multiplexed systems, advanced modulation formats, and high data rates. Particularly, undesirable distortion effects such as cross-gain modulation and pattern dependence can be eliminated in the fibre amplifiers because of its high saturation energy and slow gain dynamics. Thus, fibre amplifiers are ideal for compensating the attenuation and significantly improving the power budget in data center applications.
The research work reported here is focusing on a range of rare-earth doped fluoride glasses with a high stability, high gain and their potential applications in mid-infrared fibre lasers and fibre amplifiers. The research outcomes of fibre lasers and fibre amplifiers, providing the potential for high performance of countermeasures and other relative telecommunication applications.

Biography:
Dr. Pengfei Wang received his Ph.D. degree at the Photonics Research Centre (PRC) of Technological University Dublin (TUD), Dublin, Ireland in Nov. 2008. From 2004 to 2005, he worked for the European Space Agency and the Italian Space Agency as a Research Assistant at the Institute of Microelectronics and Microsystems, Italian National Research Council in Bologna Italy, supported by both Italian Ministry of Foreign Affairs and United Nations Educational, Scientific and Cultural Organization. He worked as a postdoc at PRC of TUD, Dublin Ireland, sponsored by the Irish Research Council Government EMPOWER Postdoctoral Scholarship, from 2009 to 2010. In Aug. 2010, he joined the Optoelectronics Research Centre

(ORC), University of Southampton, U.K., funded by the Irish Research Council and the prestigious Marie Curie Research Fellowship. he joined the Advanced Laser Lab of the SPI lasers (Southampton U.K.) as a research fellow in 2011. From Jan. 2013 to Aug. 2015, he worked at PRC of TUD as a senior research fellow (Tenured). He has been appointed as an Honored Professor at Technological University Dublin Ireland in Dec. 2019. From Sep. 2015, he has been working at the Advanced Laser Lab, Harbin Engineering University in China, as a director and distinguished professor, supported by the Chinese government "The Recruitment Program of Global Youth Experts". His research interests include novel optical glass materials, fibre lasers, computational photonics (modelling, simulation and optimization). He has authored and co-authored over 300 papers in international academic journals and international conferences with 4000+ citations and a Google H-index of 34 to date. He is holding an OSA Senior membership and a Marie Curie life-time membership.

Recent advances in the research on ancient Chinese glass

Qinghui Li

Sci-Tech Archaeology Center, Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

Abstract:
Ancient Chinese glass, with a history of more than 2,500 years, includes the glass found in China, such as soda-lime glass, soda-alumina glass and potash glass directly imported from abroad, and the native lead-barium glass, lead glass, potash glass (i.e. potash-lime glass of the Warring State period, moderate lime and alumina–potash glass and low lime–high alumina–potash glass of the Han Dynasties), potash-lead glass, as well as soda-lime glass produced by absorbing foreign technologies and recipes. It is an important material to trace the early trade, cultural and technological exchanges and mutual learning between Eastern and Western civilizations on the Silk Road. In recent years, much advances have been made, such as the native technology origin, development of composition system, provenance, manufacturing technique, colorant, Sino-foreign exchanges, development the quantitative analysis reference materials, the digital fusion of multiple information, and function, as well as the relationship between ancient glass and metal, ceramic, jade artifacts.

Biography:

Dr. Qinghui Li is a Professor and Doctoral supervisor of the Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences. He has served as the pre-assessment expert and the respondent reviewer for the key special project of the National Key R&D Program "Major Scientific Instruments and Equipment Development". His research focuses on material surface and interface analysis, scientific and technological archaeology of silicate cultural relics, development and application of optical and spectroscopy technology, and Sino-foreign exchanges on the Silk Road. He has edited and co-authored 12 books. He has published over 100 papers in peer-refereed journals including Eng Fail Anal, Archaeol Anthrop Sci, Chin Opt Lett, J Raman Spectrosc, Spectrochim Acta A, Microsc Res Techniq, Spectrosc Lett. He has delivered over 20 invited talks at conferences.