

IWSSCGGC-2010



**International Workshop and Symposium on the Synthesis
and Characterization of Glass/Glass-Ceramics**

IWSSCGGC-2010

SYMPOSIUM

July 9-10, 2010

Venue: Yashada Auditorium, Pune

PROGRAMME & ABSTRACTS

Organized By

*Centre for Materials for Electronics Technology (C-MET),
Department of Information & Technology, Govt. Of India,
Panchawati, off Pashan Road, Pune*

In association with

*Materials Research Society of India- Pune, Mumbai,
Gujarat and Kolkata chapters*

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PREFACE

Glass and glass-ceramics have become the backbone of modern technology even though the science of glass coating dates back to 12,000 B.C. Apart from their traditional uses; they play a pivotal role in various applications like optical communication, as laser host, innovative architecture, matrices for radioactive waste, immobilization, encapsulation/sealing, energy conservation, bio-medical applications, safety gadgets, automobiles, space and marine technology to name a few. Various applications of glasses stem by virtue of their physical and chemical properties such as transparency, chemical inertness, thermal stability, corrosion resistance, electrical insulation, long term durability, biocompatibility/ activity etc. Glass-ceramics form a new class of materials having enhanced properties as compared to glass alone.

In this context, R&D work has started with major emphasis in the three major sectors namely national security or strategic, industrial development (primarily small & medium scale industries) and societal activities covering some of the well defined problems of national importance such as energy, water, health care, communication and instrumentation. Ceramic materials for liquid and gas separation technology, nano-ceramics, photonic glasses for communications, high power microwave tubes etc. Optical glass is a strategic material used as lenses and prisms for making periscopes, binoculars, range-finders, gun-sights, fire directors, and scientific, photographic and survey instruments like microscopes, telescopes, cameras, projectors, theodolites etc. Besides the development of optical glasses, the work on introduction of modern techniques in glass and ceramic, basic studies on generation of colour in glasses, evaluations of different minerals of the country such as clay and mica for their suitability in specific uses, development of high temperature combustion boats are some of the important activities. The development of laser glasses, infra-red transmitting filters, synthetic quartz single crystal, high temperature protective enamels, high alumina ceramic seals and spacers etc has also been receiving profound attention across the globe. To this list, research work on foam glass, glass bonded mica, steel plant refractories can be added by keeping in mind the need of Indian industries in particular. Work in the field of optical fibre for telecommunications, sol-gel processing of glass and ceramic materials, production of glass fibre based composites and application of ceramic materials in electronics is also being pursued in the country.

This International Workshop and Symposium on the Synthesis and Characterization of Glass / Glass-Ceramics is being organized by Centre for Materials for Electronics Technology (C-MET, Pune) in association with Materials Research Society (MRSI)-Pune, Mumbai, Kolkata and Gujarat Chapters during July 7-10, 2010. Symposium will be held on 9th and 10th July, 2010. Two national symposia on similar lines have been previously organized by Materials Research Society of India (MRSI)-Mumbai Chapter in association with BARC and CGCRI in the year of 2006 and 2008. The present symposium is aimed at providing scientific information and data essential for synthesis as well as characterization of glass along with ceramics and glass-ceramics. For this symposium, we have received overwhelming response with more than 200 scientists, researchers, students and faculty from India and Abroad participating actively. This two-day symposium will cover 1 plenary lecture, 13 invited talks, 4 short talks, 24 oral presentations and nearly 150 posters by eminent scientists, researchers from India and abroad. Overwhelming response and crunch of time have forced us to place many good papers in the poster session.

This compilation contains the abstracts of invited lectures and of the research contributions from other participants. They cover a range of relevant topics from the basics to the preparation/synthesis of glass, glass-ceramics, glass-composites, glass-nanocomposites and the associated safety issues. Readers may find some inevitable overlap in the matter presented in various talks.

The Organizing Committee feels indebted to all the speakers and sponsors for their timely and unflinching support.

Dr. D.P. Amalnerkar
Chairman

Dr. G. P. Kothiyal
Co-Chairman

Dr. B. B. Kale
Convener

Materials Research Society of India (MRSI)

Materials Research Society of India (MRSI) is an interdisciplinary professional body dedicated for the growth of indigenous research and development in the area of materials science and engineering and their applications. MRSI is a founding member of Asia Pacific Academy of Materials (APAM) and is also founding adhering Body of the International Union of Materials Research Societies (IUMRS)

Centre for Materials for Electronics Technology (C-MET), Pune *(Young Organization with Ignited Minds)*

C-MET- A pioneering Institution

Centre for Materials for Electronics Technology (C-MET) was set up as a Registered Scientific Society under department of Information and Technology (formerly Department of Electronics) in March 1990, as unique concept for development of viable technologies in the area of materials mainly for electronics. C-MET is operating with its laboratories with specializations at Pune, Hyderabad and Thrissur. Besides augmenting core competence, C-MET envisions attainment of self-sufficiency in the sphere of Electronic materials, components and devices to cater to India's strategic- and industrial- applications, exploiting indigenous resources of raw materials. R&D activities in C-MET at present include development of thick film materials, polymers for electronics, specialty chemicals and glasses, ultra high purity and refractory metals, semiconductors, electronic ceramics and fine powder processing. C-MET undertakes joint R&D, sponsored research, technology transfer and consultancy projects and provides technical services.

The Formative years

During its formative years, the Directors and the diligent young scientists helped to build a state-of-art infrastructure for material research. In nineties C-MET had established infrastructure facilities like air-conditioned building and world class state-of-art characterization facilities with industry and academia in mind. In the mid nineties, C-MET established its credential as a world class research and development institution in the area of material science. World class packaging facility, Material synthesis and processing facilities have been created. The work has been recognized by industry, strategic sectors like Space and Defense. Since 2000-05, C-MET has created a brand name for itself with many projects and new state- of-art facilities like FE-SEM, AFM etc. C-MET has established tie-up with space, defense and BARC by innovating custom designed materials for them.

Keeping space with change – Breaking new grounds

Over the last few years, C-MET has increasingly focused on applying chemical and physical sciences to some of the significant challenges of our times, namely clean energy, Packaging (micro), nanotechnology, Nanomaterials synthesis, new materials for our space mission. C-MET has done excellent work for space materials and has been recognized by ISRO. C-MET has accepted the change and excellent work in Nano-science and Nanotechnology towards innovative application was under taken. Work on Nanomaterials, Glass nanocomposites and polymer nanocomposites have been undertaken. C-MET has also focused their R.D on specialty polymers, metals, alloys, advanced nano-ceramics and optical glasses. C-MET is publishing 50-60 papers in international reputed journals and 10 patents every year. ***Today, C-MET is recognized as reputed material science and knowledge based R & D and consulting organization. C-MET is also a unique material research laboratory of India.***

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TECHNICAL PROGRAMME FOR SYMPOSIUM

JULY 8, 2010

1700 -1900 hr **REGISTRATION**
1930 hr **Get-together with Dinner**

JULY 9, 2010

0800 -0900 hr **REGISTRATION**
0900-1030 hr **Inaugural Function**
 Lighting of the Lamp and Sarsawati Vandana

Welcome

Dr. D.P.Amalnerkar, Chairman, IWSSCGGC-2010

About the Symposium

Dr. G.P. Kothiyal, Co-Chairman, IWSSCGGC-2010

Address by Chief Guest

Dr. Ashok Joshi, MD, Ceramtech. USA

Presidential address

Shri R. Chandrashekhara, IAS, Secretary, Department of
Information Technology, MC& IT, Govt. of India

Plenary Lecture

Prof. Himanshu Jain, USA

Vote of Thanks

Dr. B.B. Kale, Convener, IWSSCGGC-2010

1030-1100 hr **High Tea**

TECHNICAL SESSION-I

1100-1300 hr	Session Chair: Dr. U. P. Phadke
1100-1130 hr	Invited Talk: Prof. Animesh Jha, U K. <i>Progress in Mid-IR oxide glasses - launching the 2nd revolution in the optical waveguide technology !!</i>
1130-1200 hr	Invited Talk: Prof. K. T. Jacob, IISc, Bangalore <i>Resolution of conflicting views on the thermodynamics of glass transition: a unified model</i>
1200-1230 hr	Invited Talk: Prof. Ajay K. Kar, UK <i>Laser written photonic devices</i>
1230-1300 hr	Invited Talk: Prof. A. R. Kulkarni, IIT, Mumbai <i>Conductivity Spectrum, scaling behaviour and Relaxations in Li and (Li and K) Fluorophosphate Glasses</i>
1300-1400 hr	LUNCH
1400-1600 hr	POSTER SESSION
1545-1600 hr	TEA

TECHNICAL SESSION-II

1600-1730 hr	Parallel Sessions HALL-I Session Chair: Prof. K.T. Jacob Invited Short Talk (ST-1): Shri. R. K. Gupta, BARC, Mumbai Oral Presentations: OP-01 to OP-08 HALL-II Session Chair: Prof. A. R. Kulkarni Invited Short Talk (ST-2): Dr. Basudeb Karmakar , CGCRI, Kolkata Oral Presentations: OP-09 to OP-16
1745-1825 hr	Evening Talk: Prof. Satish Ogale, NCL, Pune <i>The Nanotech approach to Energy and Environment Issues</i>
1825-1930 hr	Cultural Programme
1930 hr	BANQUET

JULY 10, 2010

0830-0900 hr **Presidential Address**
Dr. S. Banerjee, Chairman, Atomic Energy Commission, and
Secretary to Department of Atomic Energy, Govt. of India

TECHNICAL SESSION-III

0900-1030 hr **Session Chair: Shri. T. S. Sarkar**

0900-0930 hr **Invited Talk : Prof. Alicia Duran, SPAIN**
*Glass-ceramics in the system RO-BaO-SiO₂ (R= Mg, Zn) for sealing
SOFC*

0930-1000 hr **Invited Talk : Prof. G. K. Dey, BARC, Mumbai**
Some Aspects of Science and Technology of Metallic Glasses

1000-1030 hr **Invited Talk : Prof A. Srinivasan, IIT, Guwahati**
*A comparative study of bioactive glass-ceramics containing different
magnetic phases*

1030-1100 hr **TEA**

TECHNICAL SESSION-IV

1100-1300 hr **Session Chair: Dr. K.G.K. Warriar**

1100-1130 hr **Invited Talk : Prof. Manuel Almeida Valente**
Electric and magnetic properties of glass and glass ceramics.

1130-1200 hr **Invited Talk : Prof. N. Veeraiah**
*Optically stimulated non-linear optical effects in nano crystallized
lead antimony borate glass system doped with Tm₂O₃.*

1200-1230 hr **Invited Talk : Prof. V. K. Deshpande**
An Overview of Glassy Solid Electrolytes.

1230-1300 hr **Invited Talk : Dr. M. A. More, Pune University**
*Semiconducting Oxide Nanostructures: New Generation Cold
Cathodes.*

1300-1400 hr **LUNCH**

