Environmental Benefit of Glass

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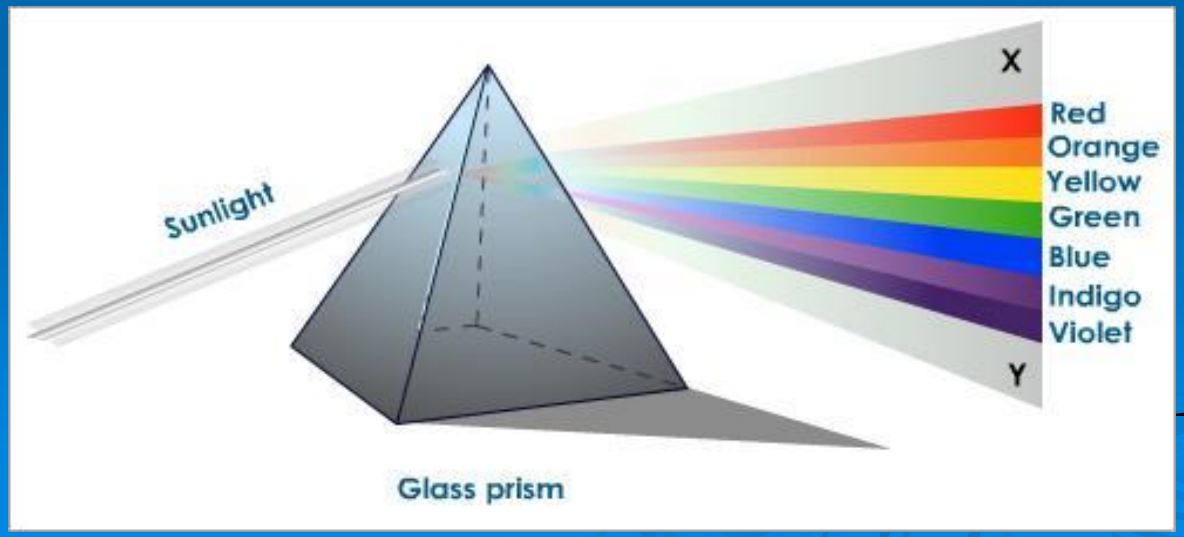
Nature of LIGHT

- The most familiar example of various colours of light is rainbow, in which dispersion causes the spatial separation of a white light into components of different wavelengths
- Prism is also a dispersive medium, used to break up light into its constituent spectral colors.



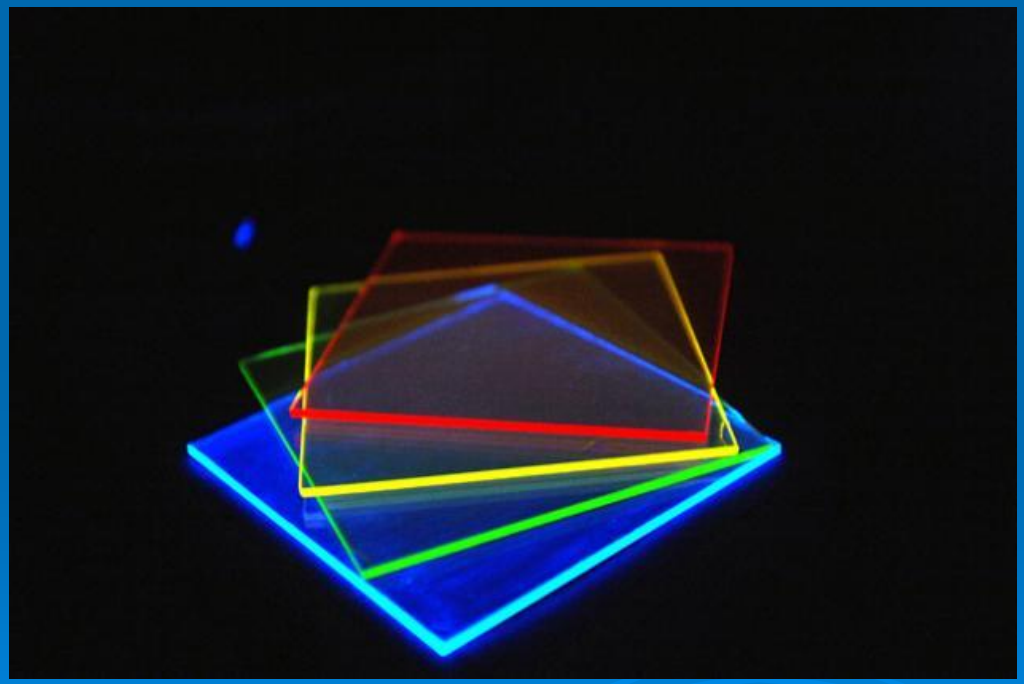
Light is a source of energy

Plastic is not a threat to glass since glass has several advantages in terms of physical and chemical properties and abundant raw materials - mainly silicates available plenty on earth crust. Glass has unlimited potential for the future in energy saving and environmental protection, renewable energy application particularly for solar panels, mobile and TV displays.

Apart from the flat glass requirement in the country, specialty glasses are increasingly gaining importance particularly looking at the future low carbon economy.

- Technology enables see-thru windows to generate electricity by spraying‘ glass surfaces with electricity-generating coatings.
- These solar coatings are less than 1/10th the thickness of ‘thin’ films and make use of the world’s smallest functional solar cells, shown to successfully produce electricity in a recently published in peer-reviewed Journal.

Recently developed by New Energy Technology, USA



Organic and inorganic hybrid glass for solar concentrator

Light falls on the surface

concentrates at the edges to supply more energy to solar cell

- Solar control glass for sustainable future: Reduces cost on energy and artificial cooling

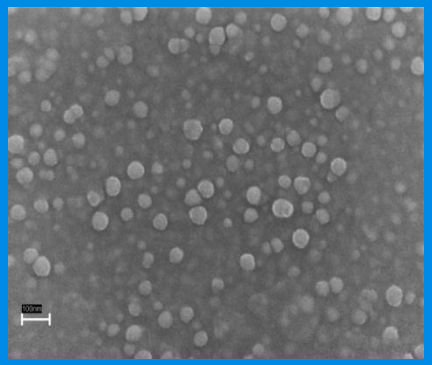
Solar Panels

Several research activities are going on in India. Industries can take advantage of the outcome.

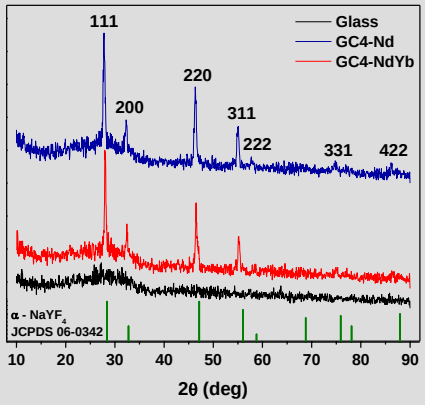
Good no. of cited Indian papers are available for reference

Oxy-Fluoride Glass and Glass Ceramics

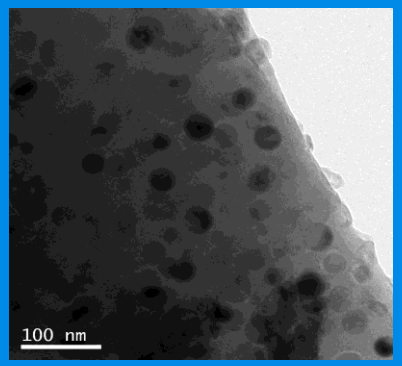
$NaYF_4$ nano-crystalline transparent glass ceramics



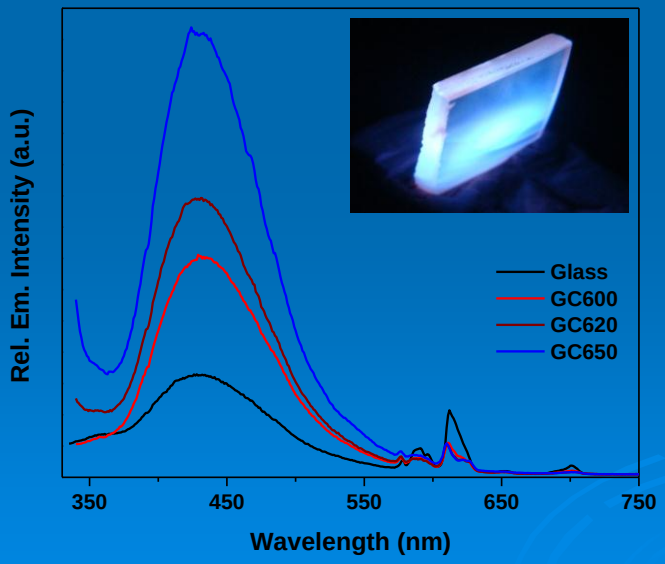
SEM

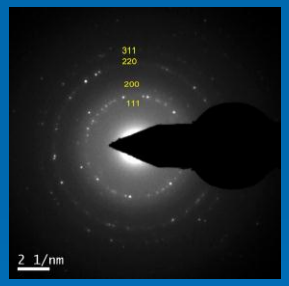


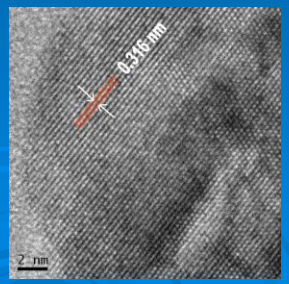
XRD

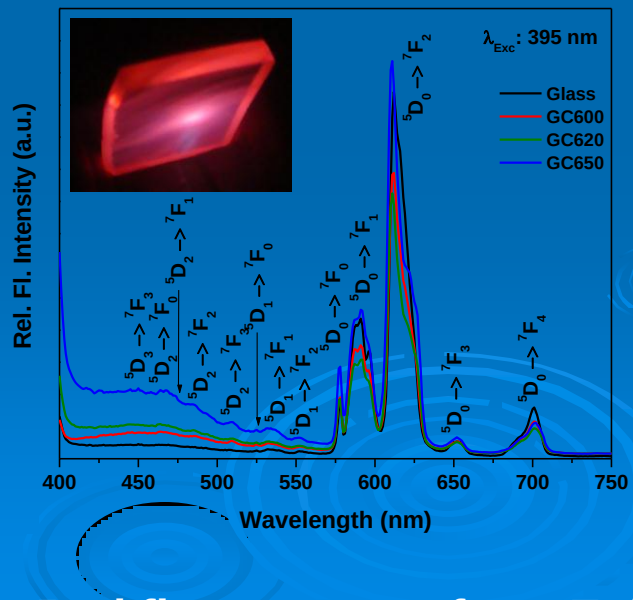


TEM









Intense Blue emission from Eu^{2+}

Red fluorescence from Eu^{3+}

DEVELOPMENT OF ENVIRONMENTAL-FRIENDLY COST EFFECTIVE LEAD-FREE GLASS POWDERS AND PASTES FOR PLASMA DISPLAY PANEL (PDP)

Industrial Collaborator: **M/s SAMTEL COLOR LTD., GHAZIABAD, UP**

- Existing glasses contain 70-80% PbO.
- Requires to be replaced by non-lead glasses according to RoHS

Objectives

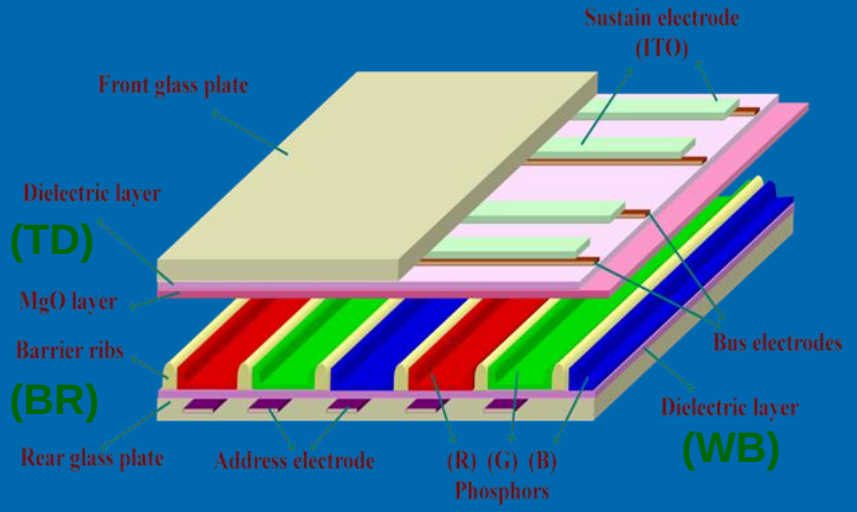
(i) To develop manufacturing process technology appropriate for industrial production of lead-free glass powders and pastes for

(a) Transparent Dielectric (TD)

(b) White Back (WB), and

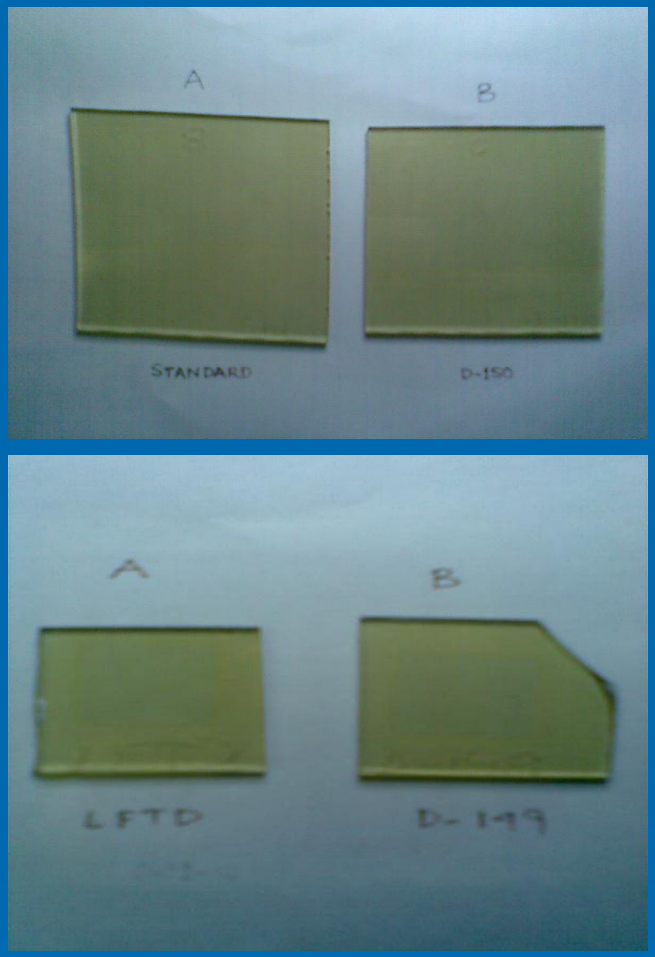
(c) Barrier ribs (BR)

(ii) To match the properties of glass powders and pastes with the existing lead-containing materials



Simplified view of a coplanar Plasma Display Panel (PDP)

PLASMA TV



Photographs show the comparison between lead-containing standard (A, left) and CGCRI developed lead-free (B, right) TD coated PDP panel substrates done at Samtel (Top) as well as CGCRI (bottom)

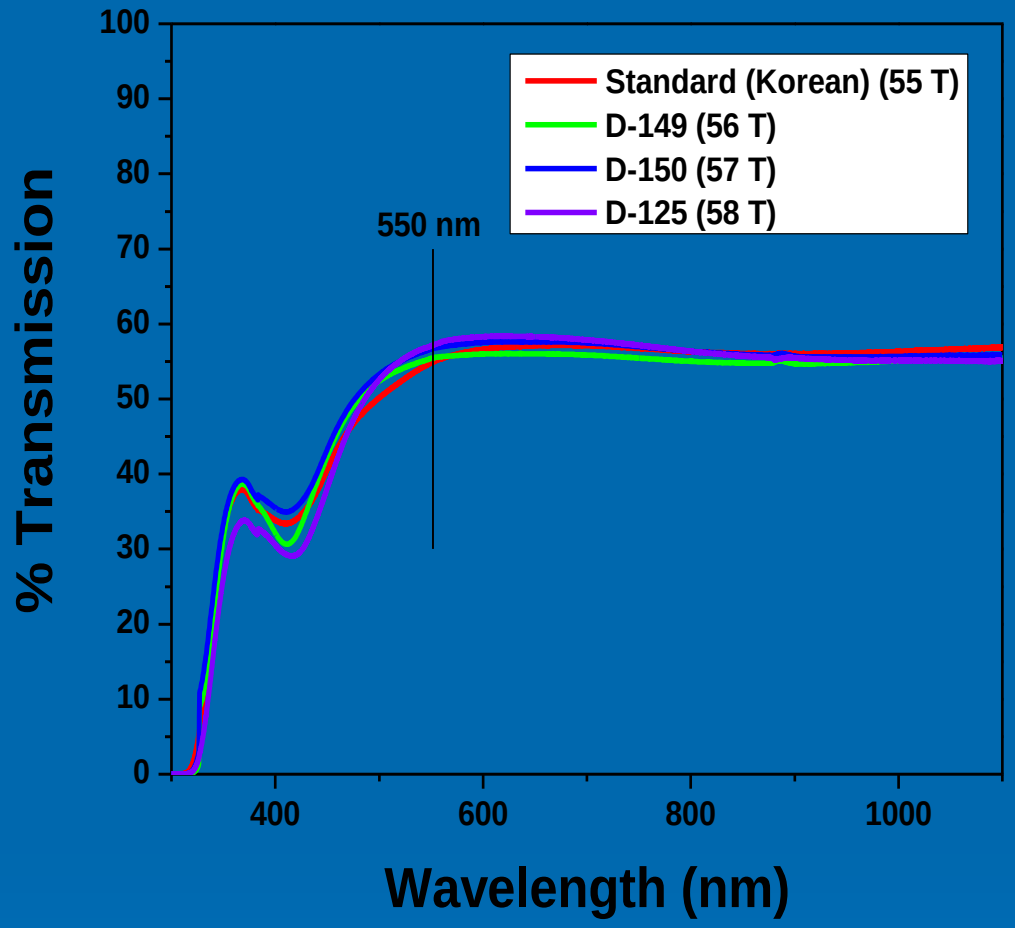


Figure shows the comparison of transmission between lead-containing standard (Red) and CGCRI developed lead-free (Blue, Violet and Green) TD coated PDP panel substrates done at Samtel as well as CGCRI

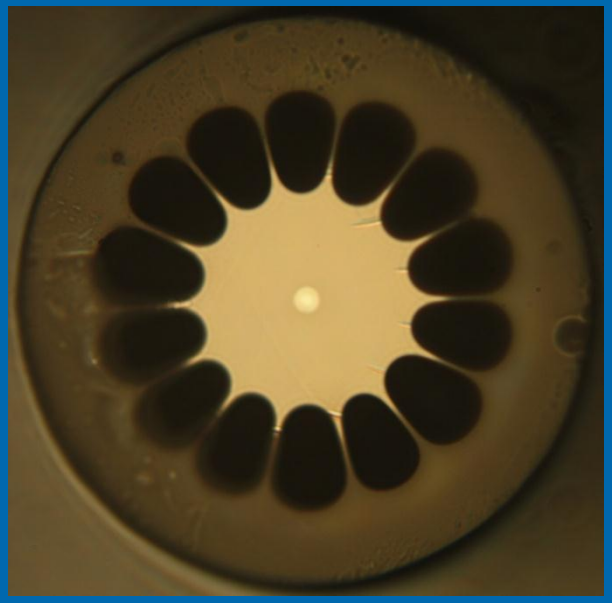
Rare earth elements have significant role in glass and ceramics for Green Photonics. Development and use of photovoltaic systems and energy efficient LEDs are no doubt finding definite trend towards sustainability, where rare earth doped phosphors convert blue light from In-Ga-N based LED into useable pure white light without UV and IR components.

This change on its way after 130 years due to certain environmental protection or efficiency regulations being imposed across the globe.

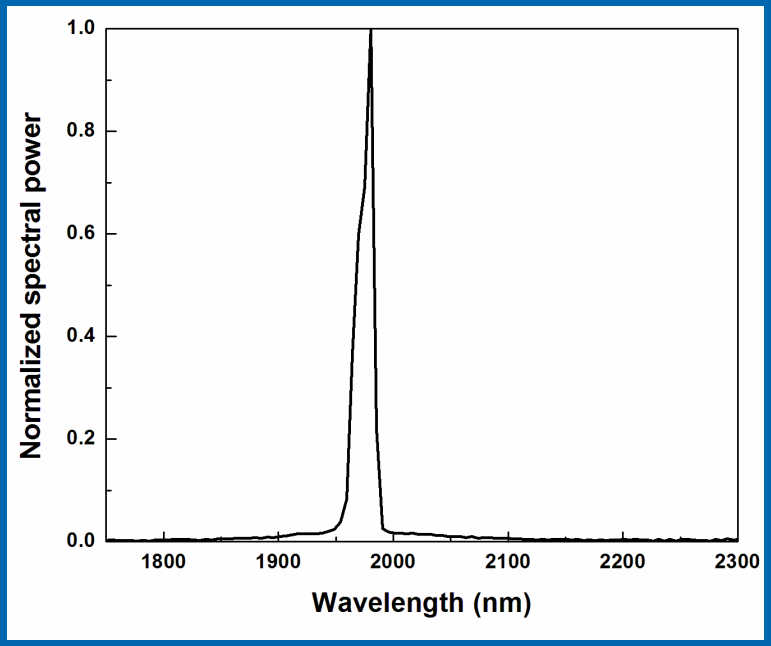
Green Building with solar panel at the roof top and solar glass in windows

High efficiency and low E glass window reduce energy use and protect homes interior

2μm laser from Yb-Tm co-doped air clad fiber



Yb:Tm = 4:1
Fiber diameter ≈ 130μm
Doped core diameter ≈ 6.21μm
Bridge width ≈ 0.586μm

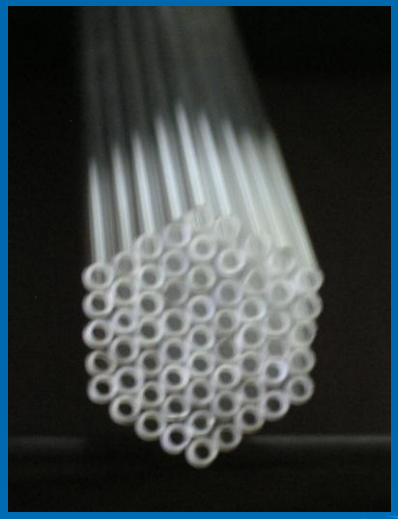


Optimized length = 1.8 m
Threshold power = 150 mW
Maximum output power = 1.90 mW

1. Stacking of capillaries:

Capillaries of suitable sizes are stacked in a hexagonal array around a central silica rod which ultimately forms the fiber core. The whole arrangement forms the macroscopic preform.

Stacking capillaries in a hexagonal array in a V-groove assembly (top: side view, bottom: front view).



Hexagonal array of capillaries

CGCRI

3. Fiber drawing:

Cane is inserted into a thick silica jacketing tube and this composite arrangement is finally drawn down to fiber.

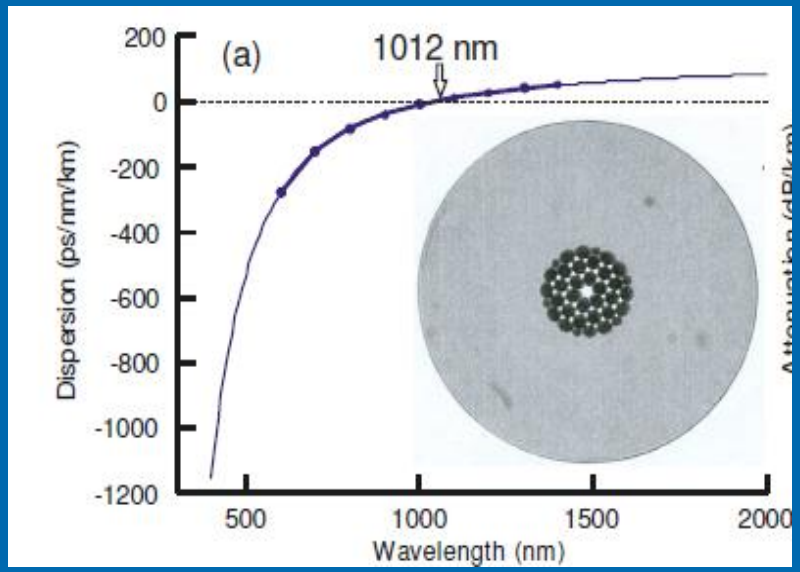
Drawing of MOF in a fiber drawing tower

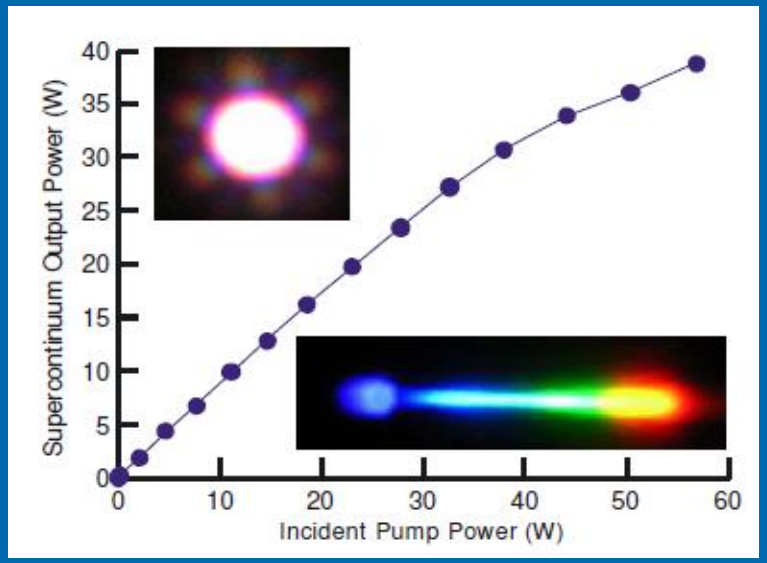
Necking of the preform during fiber drawing

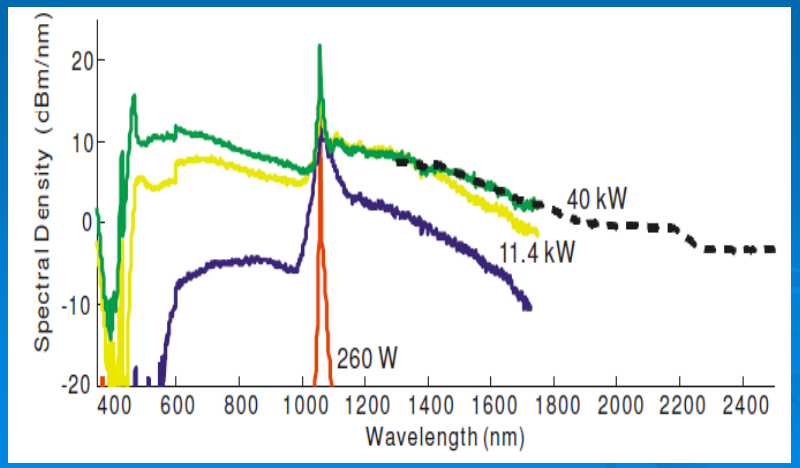
Picosecond fiber MOPA pumped supercontinuum source with 39 W output power

Kang Kang Chen,[1,*] Shaif-ul Alam,[1] Jonathan H. V. Price,[1] John R. Hayes,[1] Dejiao Lin,[1] Andrew Malinowski,[1] Christophe Codemard,[1] Debashri Ghosh,[2] Mrinmay Pal,[2] Shyamal K. Bhadra,[2] and David J. Richardson,[1]

[1]*Optoelectronics Research Centre, University of Southampton, Southampton SO17 1BJ, UK*
[2]*Fibre Optics Laboratory, Central Glass & Ceramic Research Institute Kolkata, CSIR, India*
**kkc@orc.soton.ac.uk*

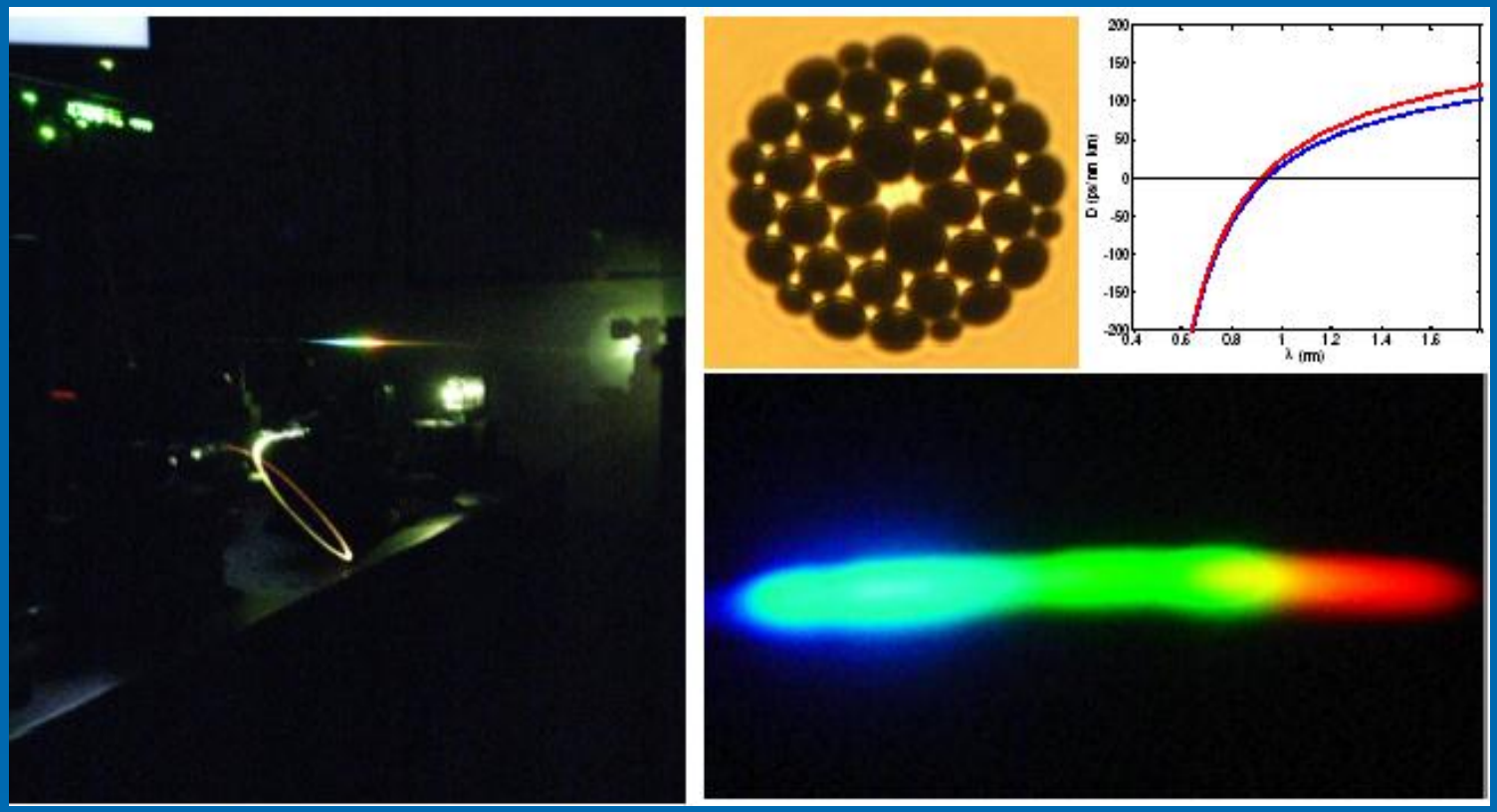






Optics Express, April, 2010

Supercontinuum experiment done in CGCRI



Artificial white light through Supercontinuum Generation

• Energy efficient cutting and welding in automobile parts using high power fiber laser

•

Application of Fiber Laser in cutting of rock and earth materials:

• Tunneling through siliceous and carbonate rock type at atmospheric and surface conditions to channel out natural gas

• Drilling through sandstone and rockstone

• Specific energy required for laser fiber is less than CO2 and Nd:YAG commercial lasers

• High beam quality and high power consuming less energy

Future Programme in China for Green Energy

China has taken ambitious plan to increase the solar energy generation from the present 17 GW generation to 20 GW by 2020

The projected requirement of clean solar glass, PV-roof, PV-curtain, PV-shade and wall-PV-array would be **4.5 billion square metre**.

China's strategic transformation reflects transition from traditional glasses to new glass and materials for building construction.

中航三鑫与航材院合作的C919国产大客机前舱风挡玻璃

The Cockpit Windshield of China's C919 large passenger jet made by AVIC Sanxin and AVIC BIAM

C919国产大型客机展示样机于2010年11月15日首次亮相珠海航展。

此次展示的样机是C919的驾驶舱和客舱前段，全长17米，高5.6米，宽3.96米。

其中所用前舱风挡玻璃为中航三鑫与航材院合作制造，客机机头采用流线造型的外形设计，驾驶舱和客舱的功能设计以“舒适性”为原则，客舱行李箱等设计融入中国元素。

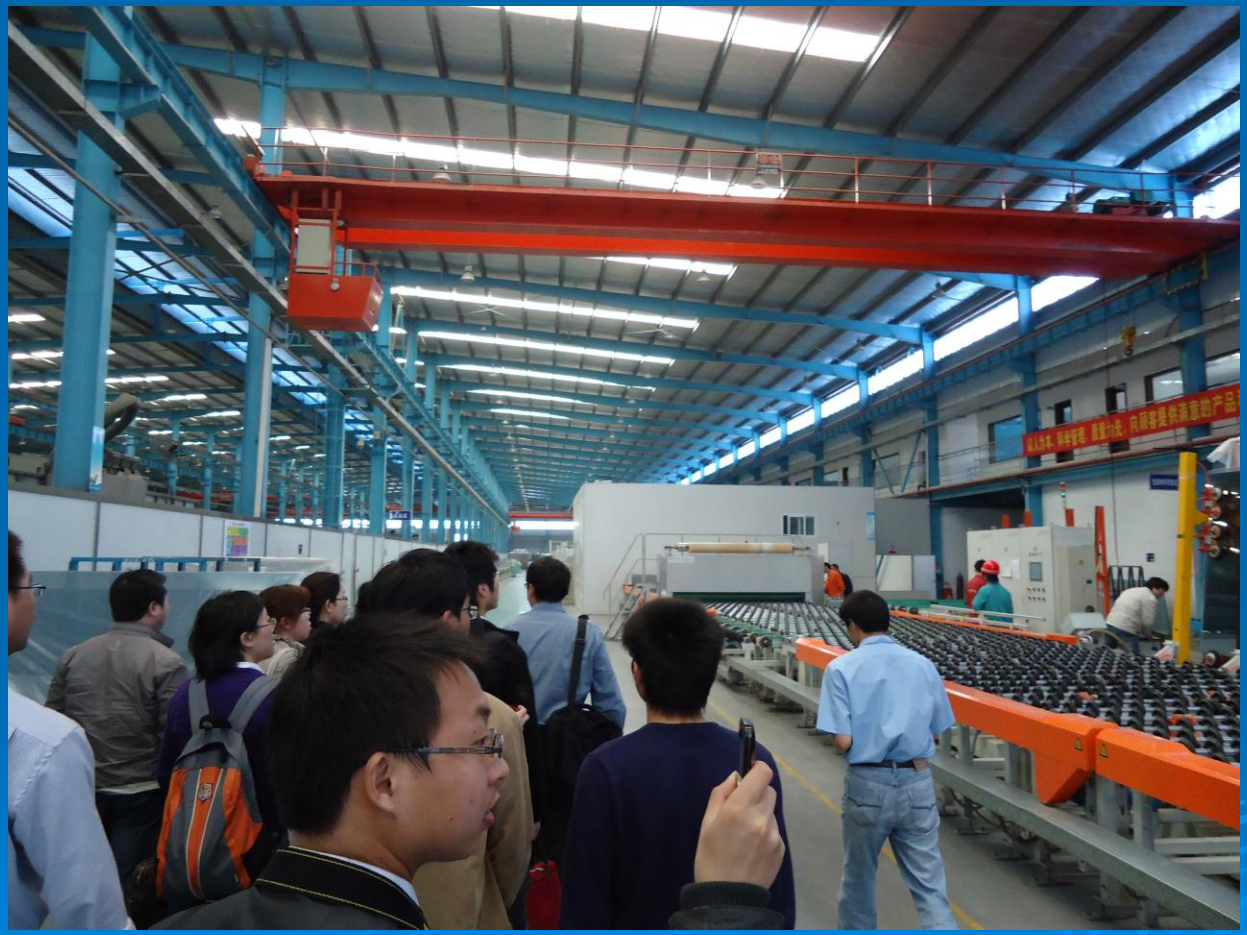
The new model of air plan C919 which made in China showed up at 8th International Aviation & Aerospace exihibition in Zhuhai on November 15, 2010,

its size is 17 meter long, 5.6 meter high and width is 3.96 meter.

The glass for aero winshield is made by Avic Sanxin and Aero insititu


ICG
国际玻璃协会2011年年会暨首届
ICG Annual Meeting 2011 & 1st Hi-Tech
主办单位：国际玻璃协会
Sponsored by: International Commission on Glass (ICG)
承办单位：中国建材国际工程集团有限公司
Organized by: China Triumph International Engineering Co.,
协办单位：中国硅酸盐学会玻璃分会
Co-organized by: The Glass Committee, CCerS
中国硅酸盐学会电子玻璃分会
Peter Simurka


TOP 7- Activities in 2011
-Expert meeting on « Structure and Vibration on Oxide Glasses », Montpellier, 24-25 March (TC26)
-Expert meeting on « Fining, Redox Chemistry and Colour Control in Glass Manufacture » Eindhoven 12-13April (TC18, TC15)
-Glass Trend 10th Year Anniversary « Bringing together Academia and Glass industry» Zandvoort, 7-9 June
-ICG Summer School in Montpellier, July 4-8 (TC23, TC01)




工程业绩
Project Performance
贵阳喜来登贵航酒店
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Dubai Emirates Park Tower Hotel
中国神华
China Shenhua


C7


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Participation in Annual Meeting of Internnational Commission on Glass (ICG) and International Conference on High Tech. Glass in March 2015

International conference on Specialty Glass and Optical Fiber: Materials, Technology and Devices

At CGCRI during August 4-6, 2011

THANK YOU