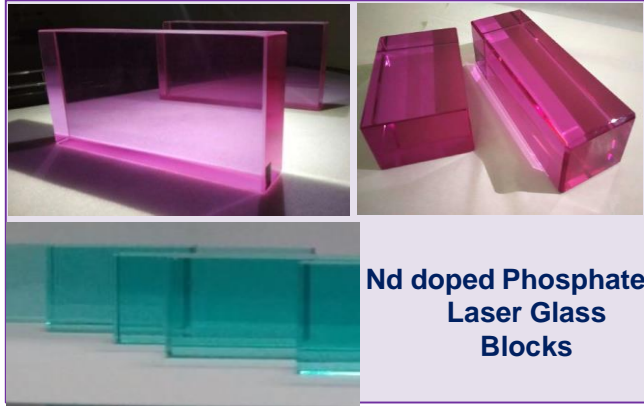


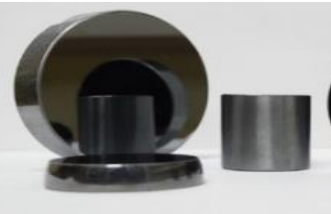
CSIR-CGCRI Transgress of Activities: Make in India to Rural Industrialization and Societal Benefits



**Pulsed Fibre laser: Use in
Additive Manufacturing,
Engraving, Marking, and
Medical applications**



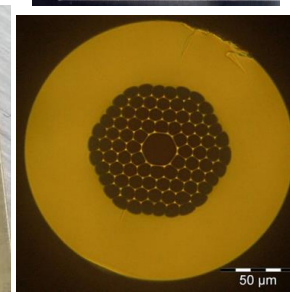
**Black Pottery: Skill Development on
Whiteware and Terracotta; Khurja
and Naroda**

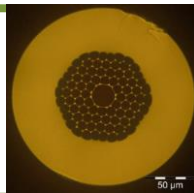


Chalcogenide Glass



**Reaction Bonded
Silicon Nitride
Missile
Radome**





Pulsed fiber laser

- Marking, Engraving, Additive manufacturing
- Healthcare and Strategic sectors



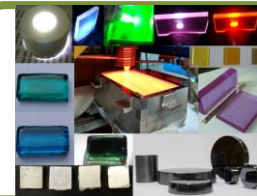
Planar anode-supported single cells

- Indigenous 1 kW SOFC Stack



Biomedical Implants

- Surface Modified Implants
- Total Joint Replacement
- Bioactive hydroxyapatite (HAp) and bio-active glass (BAG) coatings



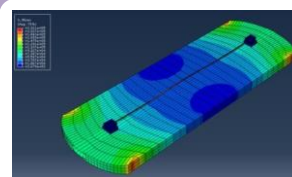
Specialty Glasses

- Radiation Shielding Window (RSW) Glass
- Specialty Glass Bead Technology
- Nd-doped Phosphate Glass
- Optical and Chalcogenide glass



Ceramic Membranes

- Iron Removal from Groundwater
- Simultaneous Arsenic and Iron Removal
- Industrial Waste Water Treatment
- Effluent treatment from Textile Industry



Fibre Bragg Grating

- Finite element analysis of long gauge FBG sensor
- Sensors tested on 8 Storey Steel Structure at CSIR-CBRI



Functional materials, Coatings

- Moisture Sensor
- Diabetic Breath Analyzer
- Piezo composite films
- Sensor for detecting trace pesticide in food
- Superhydrophobic and antimicrobial sol-gel based coatings



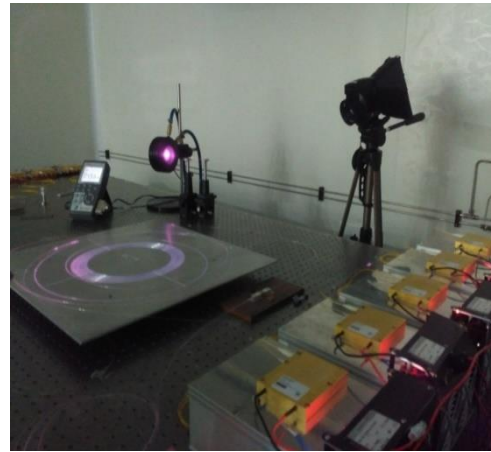
Refractory

- Refractory Aggregates from Indigenous minerals
- High temperature crucibles
- Value Added vitrified tile and other products

Specialty Optical Fibres, Fibre Lasers and Fibre Bragg Grating Sensors



Prototype Laser Module: Power 60 W/100 W and Beam quality $M^2 < 1.1$



Lab-scale demonstration: 522 W CW using Yb-doped 20/400 (LMA) developed at CGCRI

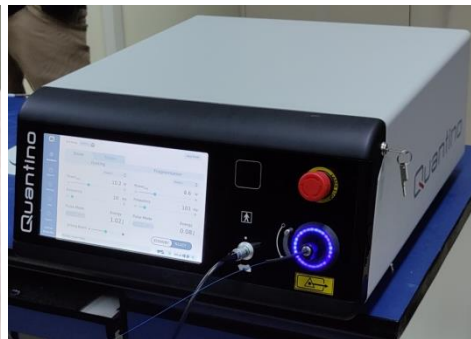


Stator end-wind vibration monitoring: power generators

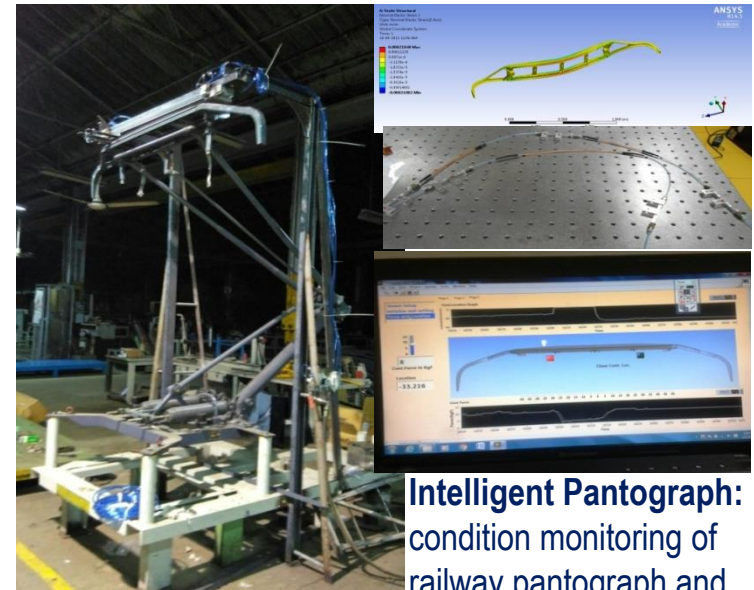


Nanosecond Pulse Fiber Laser : Marking and Deep Engraving

TRL (4-6)



A 30 W Tm-Fiber Laser for Lithotripsy: Technology transferred to industry



Intelligent Pantograph: condition monitoring of railway pantograph and overhead infrastructure

Green Energy

GENERATION
 STORAGE
 CONVERSION

Cell Components and SOFC Stack Testing at CSIR-CGCRI

Lithium Battery Components & Cell Design



Planar anode-supported single cells (TRL 4 -5) SOFC



1kW SOFC Stack



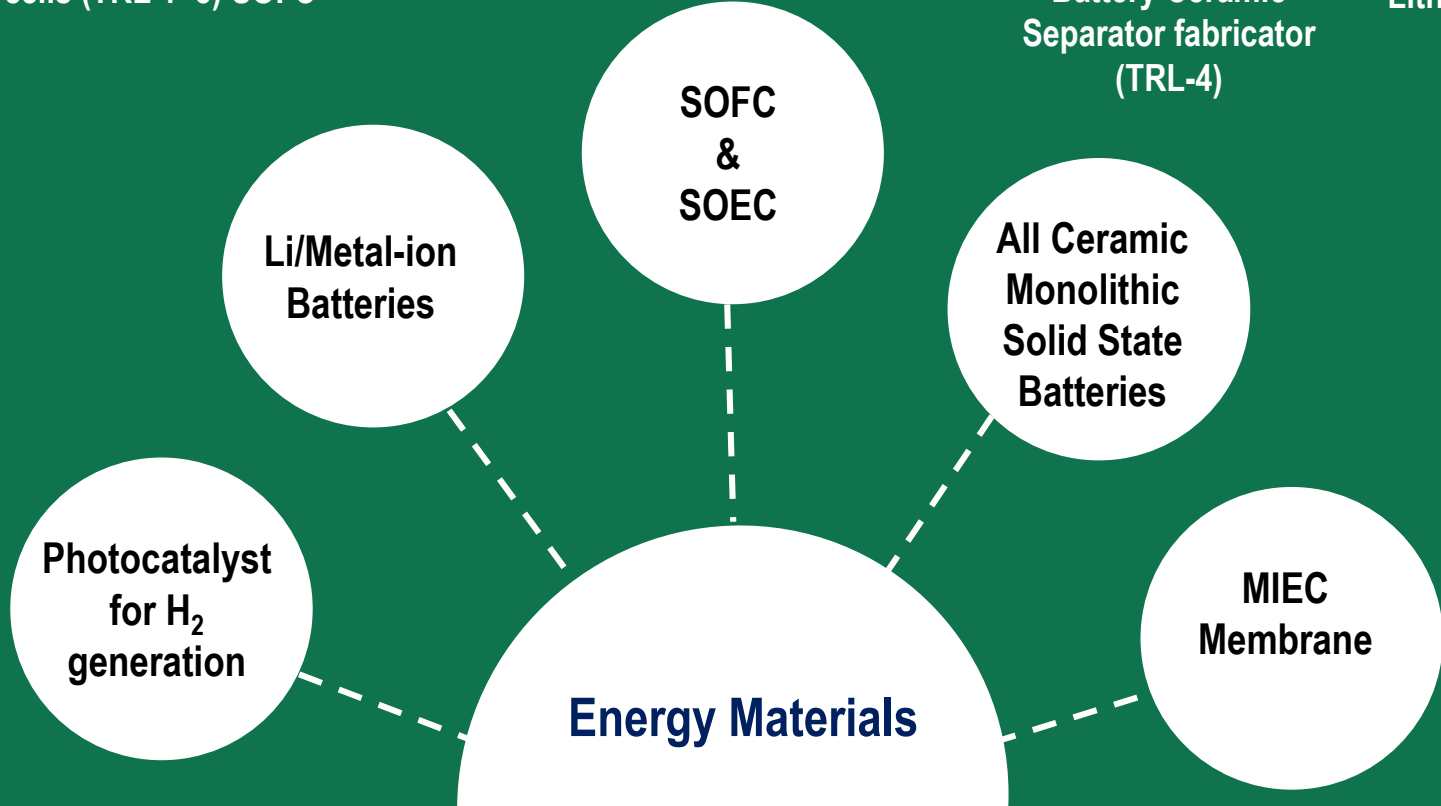
1kW SOFC Stack Demonstration



CGCRI designed Lithium Battery Separator fabricator (TRL-4)



Paper separator for Lithium Battery (TRL-4)



Affordable Healthcare: Biomedical Implants

Load Bearing

Surface Modified Implants

Total Joint Replacement

Ceramic-on-PE

Ceramic (Al_2O_3 and ZTA) based total hip prosthesis

Ceramic-on-Ceramic

HAp coating

Bioactive hydroxyapatite (HAp) and bioglass (BAG) coatings



Non-Load Bearing

Calcium phosphate based granules and scaffolds

Bioactive Scaffolds/ fillers and Injectable Cement

Calcium sulphate hemi-hydrate based bone cement



Orbital Implants

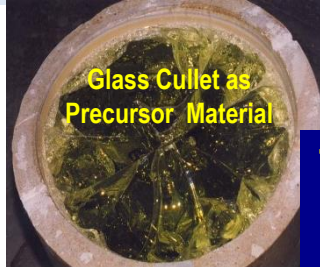
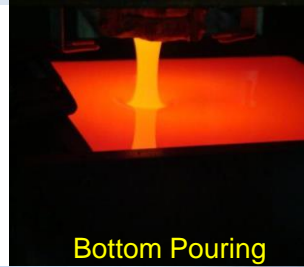
HAp integrated orbital implants



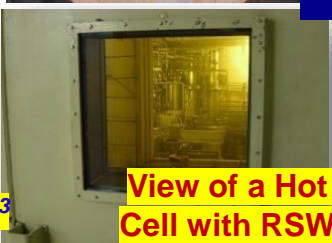
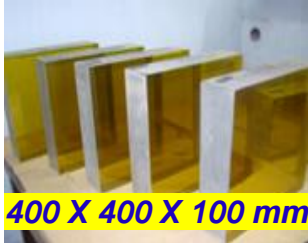
Technology for Zirconia Toughened Alumina (ZTA) based articulation for Total Hip Replacement licensed to M/s G. Surgiwear Ltd. Shahjahanpur, U.P. in June 2022

Specialty Glasses

Radiation Shielding Window (RSW) Glass through *Bottom Pouring Flow Cast Technique* (A Twin Technology) 40 L Platinum Pot Technology



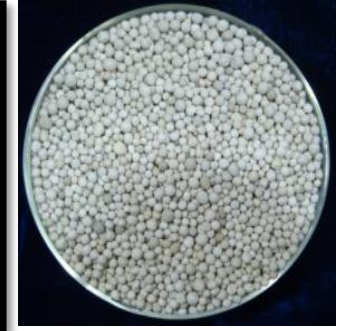
Technology
Successfully
Demonstrated



Specialty Glass Bead Technology



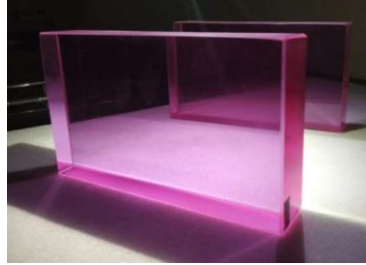
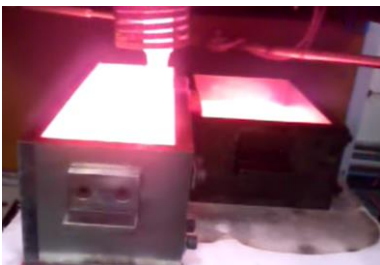
Borosilicate
Glass Frit



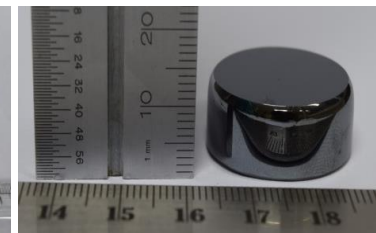
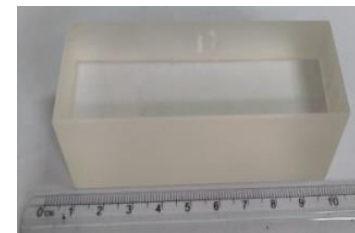
Borosilicate
Glass Bead

Technology Commercialized

Indigenous Technology for Nd-doped Phosphate Glass



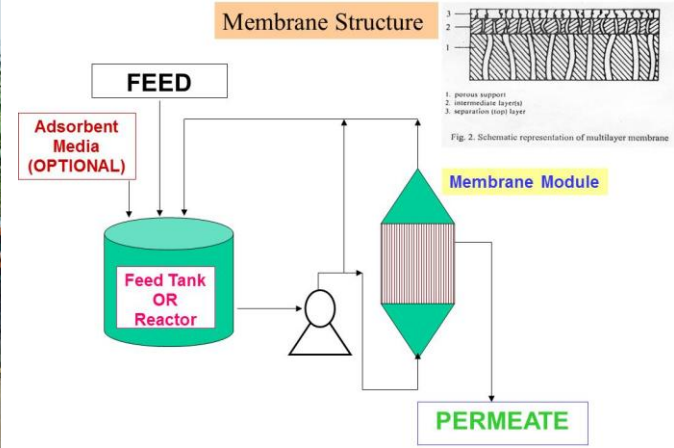
Optical and Chalcogenide Glass for Strategic Application



CERAMIC MEMBRANE



36 number Plants installed of 10000 LPD capacity By Licensee at Bihar



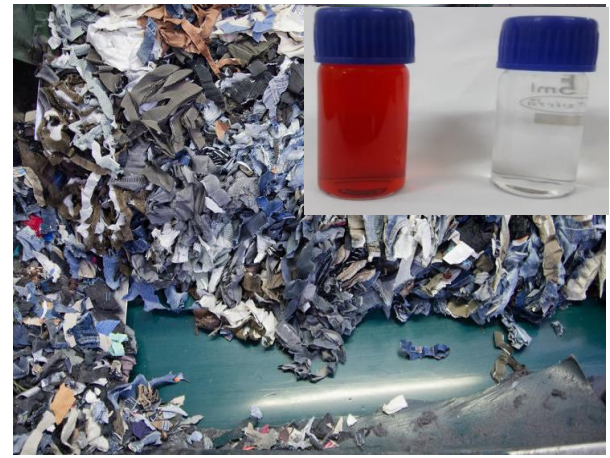
Membrane based technology for liquid filtration



99 number Plants of 5000 LPD capacity deployed for Border Security Force



10m³/hour Iron and Arsenic removal plant by CSIR-CGCRl



Development of Surface Modified Adsorbents for contaminants' removal (colour and hydrocarbon): Fabric waste from Textile industry **TRL 5**

Technology transferred and deployed



On-site installation of low ppm moisture sensor and digital meter for online measurement of moisture in transformer oil

TRL (3-5)



Hand-held Diabetic Breath Analyzer



Sensor for detecting trace pesticide in food



Piezocomposite Films as Flank Array Sensors



Superhydrophobic and antimicrobial sol-gel based coatings on fabrics



Fabricated solar panels using sol-gel based AR cum hydrophobic coated solar cover glasses

TRL (3-5)

Refractory and Traditional Ceramics



Al-Mg-O-C Refractory Commercialised at SAIL Refractory Co.



Refractory aggregates form Indigenous minerals



MgO-C Refractory in application at Vizag Steel Plant

Cored refractory for DRDL



Concast Refractory



Tiles from ISW



Mullite Refractory

High temperature crucibles



Rural Industrialization and Skill Development at Outreach Centres (Khurja, UP and Naroda, Gujarat)

Naroda: Major Activities

- Training on Glaze formulation, glazing of terracotta wares
- Training on Fabrication of terracotta jewelry and decoration of jewelry by glossy coating, glaze, acrylic paint, oil paint etc.
- Product Development, training, testing and implementation of Terracotta and allied Pottery wares
- Testing and Certification



Khurja: Major Activities

- R&D on ceramic whiteware and terracotta
- Waste Minimization & Energy conservation
- White-ware Cluster Development
- Pottery/terracotta cluster development
- Utilization of fired bone china crockery waste for fabrication of value added products

Appx. 300 number (combined for Khurja and Naroda) of rural artisans are trained in various pottery related activities every year. Apart from this more than 80 students and entrepreneurs are trained per year

Recent collaborations & partnerships



MoU Signed in the context of Indigenous SOEC Technology for Green Hydrogen Generation

January 23, 2023

Scope of Partnership

- Fabrication indigenous SOEC cell making technology where direct steam from the waste of the Thermal Power Plant and / or Nuclear Power Plant can be used.
- Reduction in cell thickness from 1.5 mm to 0.5 mm will be the main focus
- Will drive the CSIR Hydrogen Technology mission by developing 1kW level SOE



हिन्दुस्तान पेट्रोलियम कॉर्पोरेशन लिमिटेड
Hindustan Petroleum Corporation Limited
(A Maharatna Company)



Centre For High Technology
Ministry of Petroleum & Natural Gas
Government of India

MoU Signed in the context of SOFC stack

May 03, 2023

Scope of Partnership

- Development and Scale-up of indigenous next gen SOFC technology and demonstration of 10kW process line



Project MoU Signed on
Development and corrosion study
of refractory pot for SLS glass
melting during May 2023

Other recent Industry collaborators



Together we
INNOVATE



SENSORZOID PRIVATE LIMITED

- Architectural Glass Research Testing (AGRT) Facility established during March 25, 2023
- Optical glass melting facility for stringent quality optical glass requirement for Space established

Snapshot of Technologies that have been transferred

- Manufacture of plasma spray grade hydroxyapatite granules
- Pretreatment of river water for turbidity and suspended particulate removal and Pretreatment of turbid water for polishing of iron & arsenic contaminated & water using micro filtration technique
- Ceramic Membrane based technology for removal of Arsenic (including the process for media preparation) and Iron from ground water
- Manufacturing of High Density Specialty Glass Cullet for Radiation Shielding Applications
- Packaged Fibre Laser
- 30 W Continuous Wave (CW) Thulium fibre laser(TFL) at 1.94 micron & 2 micron
- Manufacturing ZTA based ceramic-on-ceramic articulating components for total hip replacement (THR)

Few Licensees

