

TECHNOLOGY NEWS

AGREEMENTS

Agreement for Manufacture of Plasma Spray Grade Hydroxyapatite Granules

CSIR-Central Glass and Ceramic Research Institute, Kolkata has signed a licensing agreement on manufacture of plasma spray grade hydroxyapatite granules with M/s Orthotech, Valsad, Gujarat. Orthotech, an FDA, ISO 9001-2008 and ISO 13485-2003 certified company is registered in India under the Companies Act, 1956. The license has been granted to the party for utilization of the knowhow and selling the product in the country on non-exclusive basis for a period of three years. As per the agreement, CSIR-CGCRI shall arrange for the training of two qualified personnel of Orthotech on the implementation of the knowhow within a period of six months from the effective date of signing. CSIR-CGCRI will also handover the technology transfer document to Orthotech within seven months from the effective date. CSIR-CGCRI will provide the ethical clearance and related documents for aforesaid products. The total cost of the technology is Rs 20 lakhs plus services taxes.



Exchange of document with Orthotech officials

It may be added here that the same technology has also been transferred to M/s Emporis Implants and Surface Treatment, Navsar, Gujarat on similar terms and basis at a price of Rs 25 lakhs. The license has been granted to the Emporis for utilization of the knowhow and selling the product in the country on non-exclusive basis for a period of three years.

Technology License Agreement for Low Melting High Sodium Glass Bead (SiBNa-23) to be used in Nuclear Waste Immobilization

On November 15, 2016 CSIR signed an agreement with H&R Johnson (India), Mumbai for the grant of license by CSIR-CGCRI to H&RJ to utilize the know-how for the manufacture of 'Low Melting High Sodium Glass

Bead (Si B Na-23)' in India on non-exclusive basis and sell the product for a specified period. Under the agreement, CSIR-CGCRI will hand over the technology transfer documents (TTD) to H&RJ within two months from the date of signing and CSIR-CGCRI will, at the request of H&RJ, depute competent representatives to render assistance in know-how implementation. Under the agreement the scope of the transfer of technology (TOT) is extendable under certain conditions mutually beneficial to both the parties.

MOU for licensing know-how of manufacturing SiAlON based products

CSIR-CGCRI signed a MOU on July 06, 2016 with Dee Tech Ceramics Pvt Ltd, Mumbai, to grant license for utilization of know-how pertaining to manufacturing of SiAlON based non-oxide ceramic products in India for two years on exclusive basis. Under the MOU signed CSIR-CGCRI will undertake a know-how development project, transfer the developed know-how with handing over the TTD and demonstrate the know-how to the representatives of Dee Tech including arranging training for them for a specified period.

MoU with Glazing Society of India (GSI) for establishing testing and research capacities for architectural glass, glazing products and its associated materials.

A Memorandum of Understanding (MoU) has been signed between Glazing Society of India (GSI) and CSIR-Central Glass & Ceramic Research Institute on Nov. 21, 2016 for the establishment of the Research and testing facility of architectural glass at CSIR-CGCRI, Kolkata.

The main objectives of this MoU is **to establish testing and research capacities for architectural glass, glazing products and its associated materials** to support and facilitate the implementation of National Building code (NBC) and Codes of Practices and product Standards (set by Bureau of Indian Standards BIS, Government of India) as well as Energy Conservation Building Code (ECBC) (set by the Bureau of Energy Efficiency (BEE) under the ministry of Power, Government of India) and such other testing and certification programs for building envelope products towards the safe, sustainable, energy efficient building envelope design, products and services. Validity Period of MoU is 5 years from the date of its signing/implementation.

Mutual Confidentiality Agreement

CSIR-CGCRI signed a Mutual Confidentiality Agreement on August 03, 2016, with EATON Technologies Pvt Ltd, Pune, to establish or further business relationship between the parties necessitating disclosure to each other certain sensitive information relating to Additive manufacturing for research and development.

MOU for development of Instrumented Smart Pantograph

CSIR-CGCRI signed a MOU for development of Instrumented Smart Pantograph on January 24, 2017 with Stone India Ltd, a multi-product engineering company located in Kolkata, serving the Indian rail road industry for over seven decades. The MOU was signed in presence of Dr V K Saraswat, Hon'ble Member, NITI Aayog during his visit to the Institute.

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
1	Specialty Optical Fibers	Optical Fiber Amplifier / Laser, Supercontinuum Source	<ul style="list-style-type: none"> Er-doped fiber for CATV and C-band optical amplifier Non-Linear Photonic Crystal Fiber (PCF) for Supercontinuum Source (500 – 2200nm) Double-clad Yb-doped fiber for laser application @ 1 micron regime 	Communication/ Defence/ Medical Electronics/Imaging	Specialty Fibers produced in house are already in use for making products/ devices (in collaboration with industrial partners), some of which are also marketed/ used commercially.	Multiple patents	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Fibre Optics & Photonics Division, CSIR-CGCRI, Kolkata
2	Er-doped Fiber Amplifier (EDFA)	Cable-TV, Optical communication system	<p>Operating wavelength: 1530 to 1565 nm (C-band)</p> <p>I/P Signal Power: - 10 to +3 dBm</p> <p>O/P Signal Power: 23 dBm (max)</p> <p>Optical Gain: 20 to 30dB</p> <p>Gain flatness: ± 0.5 dB</p> <p>Noise Figure: < 6 dB</p>	Communication/ Defence	Commercialized product	Patented	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Fibre Optics & Photonics Division, CSIR-CGCRI, Kolkata
3	All-fiber based Supercontinuum (SC) Light Source	Source for Spectroscopy, Confocal Microscopy, Medical imaging	<p>Operating wavelength: 500 to 2200nm</p> <p>O/P Power: 1.5 to 2.0 Watt</p>	Communication/ Defence/ Medical Electronics/Imaging	Ready for commercialization	Patent filed on specialty nonlinear microstructured fiber (produced by CGCRI) which is the prime component for generating supercontinuum.	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Fibre Optics & Photonics Division, CSIR-CGCRI, Kolkata

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4	Optical fiber Bragg grating (FBG) based sensors for smart infrastructure and industrial process monitoring	Structural health monitoring and industrial process control	<ul style="list-style-type: none"> Optical fiber based sensing devices. Free from electromagnetic interference. Operable in harsh environments where conventional sensors are unusable Can be used in distributed form i.e. over hundreds of sensors in a single optical fiber Tiny sensors so easily embeddable in structures during fabrication of structures leading to development of intelligent infrastructure 		Prototypes of FBG based strain, temperature, pressure and vibration sensors have been developed along with the instruments for sensor signal demodulation. The sensors are deployed at user facility and performance evaluation is underway.	Patent filing under process	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Fibre Optics & Photonics Division, CSIR-CGCRI, Kolkata
5	Specialty Borosilicate Glass Bead	Immobilization of high level radioactive liquid waste containing radioisotopes	This involves technology of making glass frits and beads of specified composition with stringent properties depending on the High Level Liquid Waste (HLW) composition. The innovation has brought paradigm shift in the technology being utilized for nuclear waste immobilization.	Nuclear Waste Management	Commercialized product	Patent filed	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Glass Division, CSIR-CGCRI, Kolkata

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6	High Density Radiation Shielding Window Glass for Nuclear Hot Cell Application	The following are the main application areas for the product indigenously developed by CSIR-CGCRI <ul style="list-style-type: none"> • Nuclear Hot cell • X-ray room • Operation theatre • Radiation therapy room 	<ul style="list-style-type: none"> • The technology on RSW glass development involves cullet making in 310 lit refractory pot, final melting in 40 lit platinum pot, casting through bottom pouring technique (cast block size is 425x425x130 mm³), annealing and final processing. • With this pilot scale facility, CGCRI has been able to supply 20 MT of RSW Glass of different sizes to BARC/ DAE. Successful attempt had also been made to produce windows of dimensions 550 × 550 × 50 mm and 700 × 700 × 35 mm from the same melt size through slumping technique in order to increase the viewing area. • CSIR-CGCRI has perfected the new twin technology through complete indigenous effort, following 	Nuclear Safety	Commercialized product	Strategic technology/ not patented	Director, CSIR-CGCRI/ Dr. Ranjan Sen, Head, Glass Division, CSIR-CGCRI, Kolkata

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7	Low moisture castable (45-75% Al ₂ O ₃)	High temperature refractory in steel, cement, petrochemicals, thermal power plants etc	<ul style="list-style-type: none"> No special mixing required Less inventory Easy installation 	Metallurgy Sector	Commercialized product		Director, CSIR-CGCRI, Kolkata
8	Mag-Chrome refractory aggregates from friable chrome ore	Refractory for steel ladle, copper smelter, cement rotary kiln	High corrosion resistance High RUL	Metallurgy Sector	Commercialized	Patented	Director, CSIR-CGCRI, Kolkata
9	Mullite refractory aggregates from Bauxite	Refractory for Blast furnace stove, Bosh, Shuttle kiln lining, Rotary kiln, Tunnel kiln	Mullite aggregates from inferior quality Bauxites of Indian origin	Metallurgy Sector	Commercialized	Patented	Director, CSIR-CGCRI, Kolkata
10	Mag-Al spinel refractory aggregates	Refractory for steel ladle, burning zone of cement rotary kiln	High corrosion resistance High RUL Eco friendly alternative of Mag Chrome refractory	Infrastructure Industry	Ready for commercialisation	Patented	Director, CSIR-CGCRI, Kolkata
11	Lime refractory	Refractory for AOD vessel for secondary steel refining, Rotary kiln	Thermodynamic stability at high temperature Improved hydration resistance High corrosion resistance at moderate basicity	Industry Sector	Ready for commercialisation	Multiple patents	Director, CSIR-CGCRI, Kolkata

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12	70-90% Alumina cement free dense self flowing castable	High temperature refractory for steel, cement, petrochemicals, thermal power plants etc	<ul style="list-style-type: none"> • Easy installation • Self-flow -no vibration during application • Less inventory • Quicker and controlled cold setting property 	Industry Sector	Commercialized	Patented	Director, CSIR-CGCRI, Kolkata
13	Orbital Eye Ball Implant	Healthcare; Functional and cosmetic rehabilitation (in which implanted artificial eye can almost exactly mimic that of healthy eye) of huge numbers of ailing one-eyed patients in India	Light-weight, highly porous, integrated with the internal eye muscles, does not require any sclera (white part of the eye), less chances of infection, permanent implant, does not require any revision surgery. Mimics the fellow eye movement.	Healthcare Industry (bio-materials)	Commercialized	Patented	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR, CGCRI, Kolkata

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14	Manufacture of plasma spray grade hydroxyapatite (HAp) granules	Healthcare; most suitable for plasma spray coating on metallic stems or shells which are further used for THR arthroplasty extensively. This coating is also widely used on dental implants as well.	Phase pure HAp with spherical shape, sizes can be tailor-made depending on the exact requirement. Freely flowable. Composition of HAp is as per ASTM spec., cost-effective, affordable.	Healthcare Industry (bio-materials)	Commercialized	Patented	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR- CGCRI, Kolkata
15	Ceramic biomedical implants (hip joint prosthesis)	Healthcare; Total hip replacement (THR) based on ceramic head and polymer acetabular cup	Product is at per ISO spec., low wear, suits Indian patients, equivalent metallic implants has been discarded world-wide, ceramic THR is gaining importance, thus huge market potential, long service life, Superior quality implant with better patient compliance eliminating chances of revision surgery	Healthcare Industry (bio-materials)	Commercialized	Patented	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR- CGCRI, Kolkata

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16	Plasma sprayed hydroxyapatite coating on metallic biomedical implants	Healthcare; For cement-less fixation of hip stem and shell in THR (total hip replacement) surgery. Bioactive material hydroxyapatite is plasma spray coated on metallic stems or shells for the purpose	Coating is done as per ASTM spec., high bonding strength of the coating, controlled phase evolution, better surface properties, cement-less fixation, that is why there is no requirement of revisions surgery, cost-effective, affordable.	Healthcare Industry (bio-materials)	Pilot Scale	Patent filing under process	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR- CGCRI, Kolkata

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17	Bioactive glass coating for dental application	Healthcare; Bioactive glass/hydroxyapatite coating on metallic tooth root part (total dental implant)	Cement-less fixation compared to the polymer cement fixation of bare metallic dental implants and gives rise to many advantages that include absence of heat generation during implantation, non-requirement of secondary surgery to remove the bone cement after some time, faster bone resorption, etc.; more adherent bioactive coating by using suitable bonding oxide, mechanically strong, adherent bioactive coating on metallic implant substrates including titanium and its alloys, novel recipe of a suitable blend of oxides to produce more chemically adherent bioactive glassy coating on surgical grade stainless steel, Co-Cr-Alloy, titanium and its alloy surface in orthodontic application	Healthcare Industry (bio-materials)	Commercialized	Patented	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR- CGCRI, Kolkata

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18	Synthetic bone graft material	Porous scaffolds, granules, powders for bone development/ faster augmentation, dental filler, perodontic applications.	Superior osteo-conductive/ inductive properties, most effective material when applied in case of bone loss due surgery or trauma or accident, frequent use in periodontic applications, any regular size, shape can be fabricated and used, can be used with pharmaceutical drugs or growth-factors, freely flowable granules can also be used for plasma spray purposes, effective for intra-medullary bone development either. The scaffolds would replace lost bone which otherwise substituted by analogous or autologous bones resulting additional wounds and transmission of AIDS infections.	Healthcare Industry (bio-materials)	Commercialized	Patented	Director, CSIR-CGCRI/ Dr. V K Balla, Head, Bio Ceramics & Coatings Division, CSIR- CGCRI, Kolkata

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19	A Process for Preparation of Palladium membrane over Ceramic Substrate for selective hydrogen separation	Palladium membrane system can be utilized efficiently in a variety of industrial processes. These processes involve separation of hydrogen from feed streams produced from gasification, reforming or petrochemical processes. This has been identified as a promising option for hydrogen production in future power production systems and industrial chemical	<p>About Pd</p> <ul style="list-style-type: none"> • Pd has extraordinary capacity to adsorb Hydrogen. • Pd particles are capable of absorbing 900 times its volume of hydrogen at RT and normal atmospheric pressure. • Hydrogen is uniquely soluble in the bulk palladium and is capable of dissociating hydrogen into protons, thus forming palladium hydrides. <p>About Pd membrane</p> <ul style="list-style-type: none"> • Pd membrane delivers pure H₂ as product from a stream of mixed gas mixture containing hydrogen. When palladium is used as a membrane for separation of hydrogen from the mixed gas stream, selective permeation of hydrogen through the membrane occurs by the process of adsorption, dissolution and 	Chemical Industry	Laboratory Scale	Patent filing under process	Director, CSIR-CGCRI/ Dr. S Dasgupta, Head, Ceramic Membrane Division, CSIR-CGCRI, Kolkata

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
20	Ceramic Membrane based technology for removal of Arsenic (including the process for media preparation) and Iron from ground water	Removal of Iron, Arsenic and other suspended and colloidal particulate matter from contaminated groundwater	<p>a) Simultaneous removal of arsenic and iron from highly contaminated ground water for producing sparkling quality drinking water (with arsenic content below the WHO recommended limit (As <0.01 ppm) and negligible iron content (Fe <0.1 ppm).</p> <p>b) Excellent adsorption capacity of the media (7-8 times higher than normally used granular Ferric Hydroxide).</p> <p>c) Modular design with flexible production capacity (500 – 20000 LPD, 12 hours operation a day)</p> <p>d) Semi-automatic, user-friendly operating procedure can be operated by even the female members of the community.</p> <p>e) One time media addition in 3 – 6 months is sufficient for 0.5 – 1 ppm arsenic</p>	Water treatment Community Level	Complete Technology package up to 20000 LPD for commercial Exploitation	Patented	Director, CSIR-CGCRI/ Mr. Swachchha Majumdar Principal Scientist Ceramic Membrane Division, CSIR-CGCRI, Kolkata

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
21	Ceramic membrane based high capacity modules for pretreatment of turbid water	Removal suspended and colloidal particulate matter from River water for application as pretreatment final polishing stages such as Reverse Osmosis	<p>a) Scaled up capacity of modules.</p> <p>b) Plant capacity up to 1 Lakh Litre per day, 12 Hrs. operation a day</p> <p>c) Modular design in battery array</p> <p>d) Semi-automatic, user-friendly operating procedure.</p> <p>e) Can be integrated with Reverse Osmosis system.</p> <p>f) Scope of supplying quality drinking water at a much lower cost</p>	Water treatment Community Level	Complete Technology package up to 100000 LPD for commercial Exploitation	Not Patented	Director, CSIR-CGCRI/ Mr. Swachchha Majumdar Principal Scientist Ceramic Membrane Division, CSIR-CGCRI, Kolkata

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
22	Ceramic Membrane based Process for Treatment and Recycling of Tannery Effluent	The process may have potential application in the tannery industry where large amount of toxic effluent is produced having high chemical and biochemical oxygen demand, suspended and dissolved solids, chromium, surfactants, etc. The ceramic membrane based process helps in treatment of such effluent not only for safe discharge in the environment, but also for recycling the effluent in tanning operations. Since	<ul style="list-style-type: none"> • Significant reduction of turbid and suspended organic and inorganic contaminants including toxic components • Cost-effective and easy to operate the system • The long shelf life of ceramic membranes, durability and low cost of the membrane modules and relatively much lower membrane fouling with ease of cleaning with less number of cleaning cycle • Modular design with flexibility of scale-up • No requirement of additional chemical addition • Very low volume of sludge generation • Can be used as tertiary treatment of tannery effluent prior to Reverse Osmosis treatment. 	Leather Industry	Technology demonstrated at commercial level	Not Patented	Director, CSIR-CGCRI/ Mr. Swachchha Majumdar Principal Scientist Ceramic Membrane Division, CSIR-CGCRI, Kolkata

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
23	Planar anode-supported solid oxide fuel cell	Intermediate temperature (750 – 800oC) energy conversion devices; stationary power through renewable energy	<ul style="list-style-type: none"> • Single cells of dimension 10 cm x 10 cm x 1.5 (\pm 0.05) mm is the standard size, custom size and shape is also feasible. • Operates in the temperature range 750–800°C; suitable for intermediate temperature SOFC (IT-SOFC) stack application where metallic stack components can be used. • Hydrogen and/or reformed natural gas can be used as fuel and oxygen and/or air can be used as oxidant. • The electrical power output (peak) from each cell is in the range of 40 - 45 W at an operating temperature 800°C using H₂ as fuel and O₂ as oxidant • The single cells are the building blocks of an SOFC power pack and can be used accordingly. 		Developed at laboratory scale; ready for technology demonstration and transfer	Multiple patents	Director, CSIR-CGCRI/ Dr. Rajendra N. Basu, Chief Scientist & Head, Fuel Cell & Battery Division, CSIR-CGCRI, Kolkata

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24	Moisture sensor (5-95%RH) Moisture meter (5-100 ppm moisture)	Moisture detection in any system or environment	ppm moisture detection in transformer oil useful for improving the dielectric break down voltage of transformer oil and a process of preparation thereof.		Laboratory Scale		Director, CSIR-CGCRI/ Dr. P Sujatha Devi, Principal Scientist & Head, Sensor & Acuator Division, CSIR-CGCRI, Kolkata
25	Optical quality scratch resistant hard coatings on CR-39® ophthalmic lenses and related plastics	Coatings can be applied on ophthalmic lenses, camera lenses, optical devices and other related plastic products of various refractive index values	Simple process; low curing temperature (95°C); excellent adhesion (class 5B; ASTM D3359), hardness (>6H; ASTM D 3363) and durability. These types of coatings have potential demand in all over the globe including India; the demand is increasing day by day. The coatings can be applied on different plastic substrates as mentioned above		Commercialized	Patented	Director, CSIR-CGCRI/ Dr. Goutam De, Chief Scientist & Head, Nano Structured Materials Division, CSIR-CGCRI, Kolkata

Sl. No.	Technology	Application/Uses	Brief Profile	Industry Sector	Validation Level (if TRL is available, please provide the same)	IPR Status	Contact Person
26	Highly transparent, scratch resistant, hard and protective coatings on polycarbonate (PC) sheets and related plastics	Coatings can be applied on windows in buildings, automobiles and protective panels for computer screens, television sets and the like and other related plastic products	Simple process, low curing temperature (~95°C)/UV curing, excellent optical quality, adhesion (class 5B; ASTM D3359), hardness (4H~6H; ASTM D 3363) and durability. These types of coatings have potential demand in all over the globe; the demand potential is increasing because PC is unbreakable and light in weight compare to glass. The coatings can also be applied on other related plastics.		Lab scale up to a dimension of 2 ft x 2 ft	Patented	Director, CSIR-CGCRI/ Dr. Goutam De, Chief Scientist & Head, Nano Structured Materials Division, CSIR-CGCRI, Kolkata