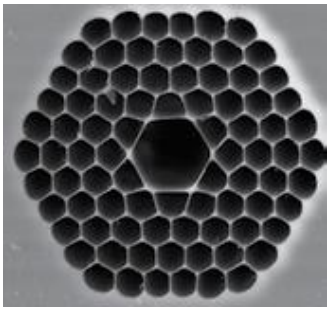
TECH PROFILE

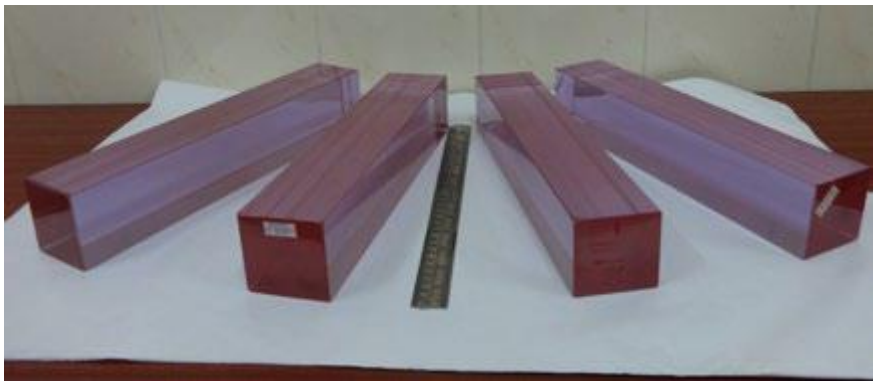
1.	Title of Product/Process/Design/Equipment	**Specialty Optical Fibers**
2.	Summary	Specialty optical fibers are instrumental in development of fibre optics based optical components for application in communication, oil and gas exploration, healthcare, defence, automotive and aerospace sectors. The CSIR-CGCRI technologies cover optical amplifiers, fibre lasers, broad band sources etc. Erbium doped single mode fibre for low power optical amplifier, Er/Yb co-doped double clad fibres for high power optical amplifiers, non-linear photonic crystal fibres for broad band sources, double clad Yb-doped fibres for high power lasers are some of the available technologies and products.
3.	IPR Status	Patented
4.	Application/Uses and Target Industry Sector	Optical communication; lasers for strategic applications, supercontinuum light sources
5.	Salient Technical Features	High power fiber lasers at operating wavelength of 1064nm; for PCF, supercontinuum generation in visible and mid-IR regions; high power beam delivery by hollow core PCFs
6.	Level/Scale of Development	Available for licensing
7.	State of Commercialization	Under commercialization in partnership with industry
8.	Major Raw Materials Utilized	High purity silica tubes, silicon tetrachloride, germanium tetrachloride, phosphorous oxychloride, ultra HP gases such as oxygen, nitrogen, argon, helium, hydrogen etc
9.	Major Plant, Equipment and Machinery Required	MCVD, OVD units for pre-form fabrication, drawing towers, characterization set-ups, analysis facilities.



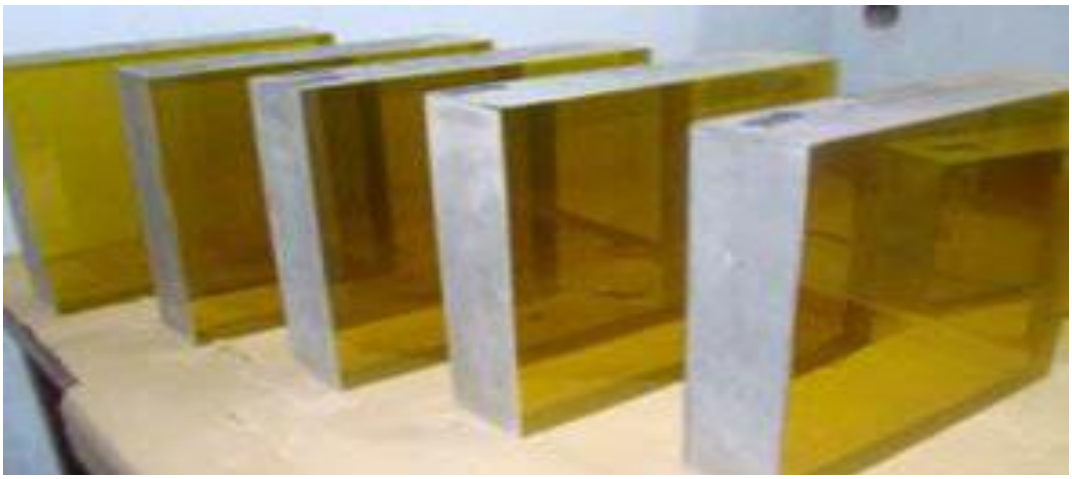
1	Title of Product/Process/Design/Equipment	**Erbium-doped Fiber Amplifier (EDFA)**
2	Summary	EDFA is a key component for community antenna television (CATV) and fibre-to-the-home (FTTH) technology. The CSIR-CGCRI technology in this regard, developed in partnership with industry, comprise of specialty optical fibre and a series of electronic input with controls which can be fitted intermittently along optical cable fibres. It restores energy loss during transmission and ensures high quality pictures, sound and connectivity.
3	IPR Status	Patented
4	Application/Uses and Target Industry Sector	Cable TV, optical communication systems; application in the telecom sector
5	Salient Technical Features	Specifications fine-tuned for application in CATV and WDM; operating wavelength of 1540-1530 nm for former and C-band region for the latter; output power ranging from 20-23 dBm and 18-20dBm respectively.
6	Level/Scale of Development	Available for licensing
7	State of Commercialization	Commercialized
8	Major Raw Materials Utilized	Er-doped fibre, 976nm pump laser diode, driver and controller for pump laser diode, WDM coupler and isolator
9	Major Plant, Equipment and Machinery Required	Tunable laser source at C-band, optical spectrum analyser, power meter, splicing machine

1	Title of Product/Process/Design/Equipment	**Specialty Borosilicate Glass Bead for Nuclear Waste Immobilization**
2	Summary	High level liquid waste produced by nuclear plants contain extended half-life isotopes that have to be immobilized to ensure safe disposal. Borosilicate glass beads with specific sizes, molecular structures and physical shapes have been developed by CSIR-CGCRI that exhibit stringent physical, chemical and mechanical specifications. The technology allows remote control of the entire operation and allows recovery and recycling of valuables and is non-hazardous to the operating personnel.
3	IPR Status	Patented
4	Application/Uses and Target Industry Sector	Immobilization of nuclear waste in atomic energy installations; nuclear fuel industry; waste management
5	Salient Technical Features	Glass beads of desired sizes made out of melted frits used in the immobilization process. Spherical beads of dimensions 2-4 nm having desired physical, chemical and mechanical properties have facilitated feeding into the Joule melter
6	Level/Scale of Development	Available for licensing
7	State of Commercialization	Under commercialization in partnership with industry
8	Major Raw Materials Utilized	Quartz, borax decahydrate, granular sodium carbobnate of dense variety, iron oxide and synthetic titanium dioxide
9	Major Plant, Equipment and Machinery Required	Batch mixer, rotory smelter of 1MT capacity, pouring facility, crusher, pulverizer and nebulizing facility, hot air oven, secondary heat treatment furnace.

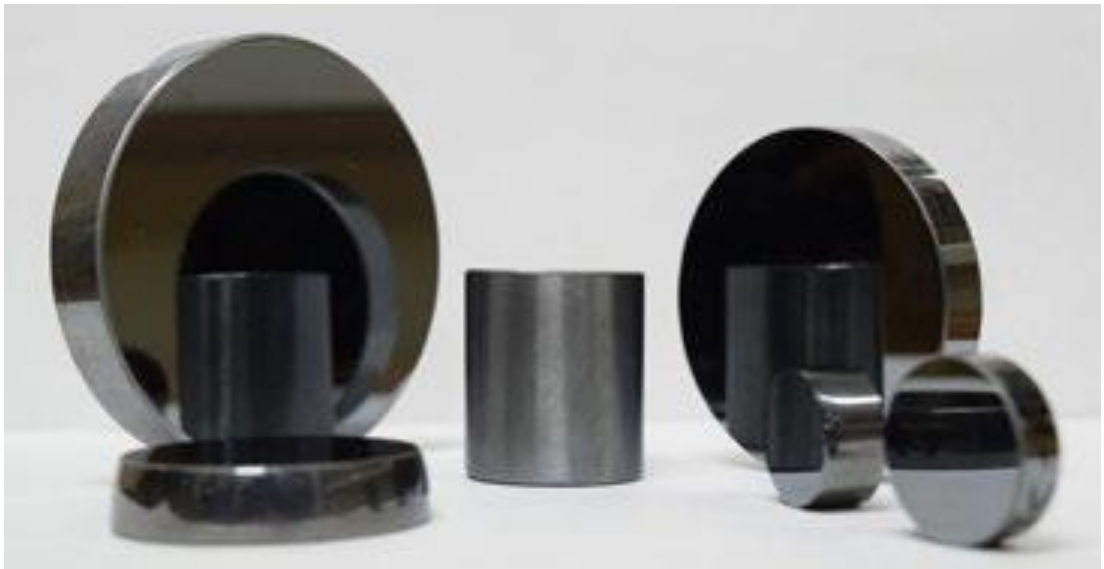
1	Title of Product/Process/Design/Equipment	**Neodymium doped phosphate glass for high energy and high-power laser application**
2	Summary	Indigenous technology for development of large sized Nd-doped phosphate glass is being developed at CSIR-CGCRI for high-power high-energy laser systems. Facilities exist for 5 litre melting to produce glass blocks of stipulated sizes, while a pilot plant of 15 litres scale glass melting facility is being established. The blocks meet with the stringent product specifications required by the end users.
3	IPR Status	No
4	Application/Uses and Target Industry Sector	Application in high power laser; defence and other strategic uses.
5	Salient Technical Features	Glass blocks with density 2.78 gm.cm-3; refractive index 1.53, emission wavelength 1.053 nm. Production of glass blocks in different dimensions (in 5 litre capacity) to produce laser rods and discs.
6	Level/Scale of Development	Lower scale production achieved that is being upscaled for translation
7	State of Commercialization	Produced on user demand
8	Major Raw Materials Utilized	Metaphosphates of Al, Ba, K and Nd_2O_3 as dopant
9	Major Plant, Equipment and Machinery Required	Resistive heating glass melting furnaces; induction heating glass melting furnace, annealing furnaces, casting devices and glass processing equipment.



1	Title of Product/Process/Design/Equipment	**High Density Radiation Shielding Window Glass for Nuclear Hot Cell Application**
2	Summary	Radiation shielding glasses are used in nuclear reactors and nuclear processing units. CSIR-CGCRI technology encompass production of homogenous defect free high density RSW glass block (stabilized and unstabilized) of varying sizes.
3	IPR Status	Trade secret
4	Application/Uses and Target Industry Sector	Nuclear installations including nuclear hot cells, x-ray room, radiation therapy room etc. Atomic energy and nuclear industry sectors.
5	Salient Technical Features	Technology covers melting, casting, annealing and processing to final product; densities vary from 3.6 gm/cc to 5.2 gm/cc. Windows of dimensions 550x550x50 mm and 700x700x35 mm can be produced.
6	Level/Scale of Development	Pilot facility established.
7	State of Commercialization	Under commercialization in partnership with industry
8	Major Raw Materials Utilized	Quartz, red lead sodium carbonate, potassium carbonate and cerium oxide
9	Major Plant, Equipment and Machinery Required	Refractory pot production facility, jaw crusher



1	Title of Product/Process/Design/Equipment	**Chalcogenide glasses for IR Optics, photonics and sensor application**
2	Summary	Chalcogenide glasses developed in customized sizes and compositions are poised to replace germanium optics for thermal imagers and night vision devices. CSIR-CGCRI is working towards developing such glasses for cost-effective solution for strengthening the national defence sector.
3	IPR Status	No
4	Application/Uses and Target Industry Sector	Thermal imaging, supercontinuum sources, amplifiers/lasers, sensors and environmental monitoring devices. Wide application in defence sector
5	Salient Technical Features	Extended transmission in the MWIR (3 – 5 μm) and FWIR (8 – 12 μm) bands; Lower temperature coefficient of refractive index (dn/dt), wider transmission window, higher usage temperature than Ge single crystal; Cost-effective and easier fabrication for lens production; Suitable for fabrication of uncooled thermal imaging devices
6	Level/Scale of Development	Lab scale development
7	State of Commercialization	Lab scale development
8	Major Raw Materials Utilized	Chalcogens (S, Se, Te, Sb, As, Ge)
9	Major Plant, Equipment and Machinery Required	Glove box, rocking furnace, annealing furnace, distillation unit, ampule sealing unit and glass processing equipment



1	Title of Product/Process/Design/Equipment	**FBG Sensors for Structural Health Monitoring**
2	Summary	The technology is used in air pre-heater temperature monitoring systems that detects leakages of air pre-heaters through temperature monitoring. The system is immune to interference and provides enhanced safety. Small size makes them amenable to being embedded into various structural materials. Similar sensors are also used for in situ measurement of structural parameters in moving systems such as railway pantographs.
3	IPR Status	Patented
4	Application/Uses and Target Industry Sector	Structural health monitoring of static and movable structures e.g. railways, power masts, buildings etc; monitoring industrial installations such as boilers. Application in railways, construction and power sectors.
5	Salient Technical Features	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
6	Level/Scale of Development	Available for licensing
7	State of Commercialization	Under commercialization
8	Major Raw Materials Utilized	Standard communication grade optical fibers, and electronic components.
9	Major Plant, Equipment and Machinery Required	Standard equipment for setting up characterization facility for sensors suitable for commercial use. Universal testing machine, spectrum analyzer, shake table for calibration etc.