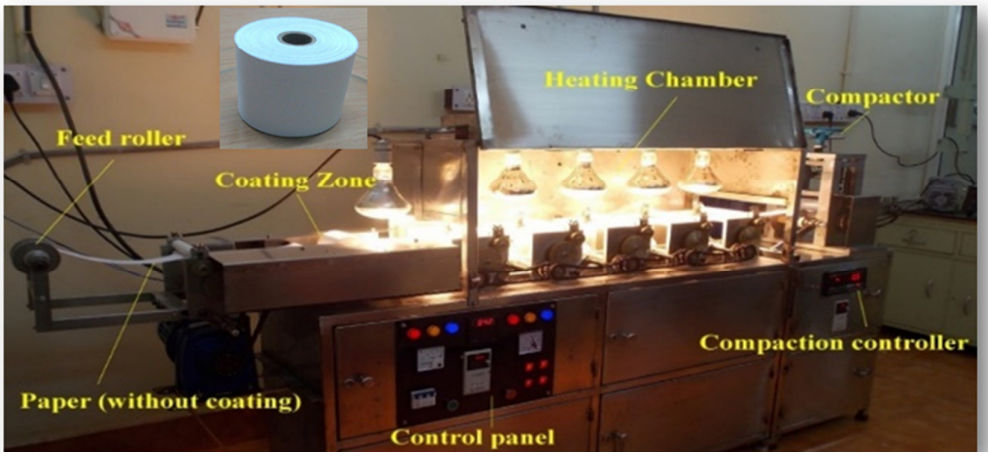
Fast Track Translational (F T T) Projects

Paper-based Ceramic Separator for Li-ion Battery Application

No alternative paper based separator product is available in India for application in Lithium-ion battery/Super capacitor technology. Commercially available polymer-based separators are from abroad and very expensive. Therefore, the process of making such paper based ceramic separator can be retrofit with the paper making industry for producing ceramic separator as a paper-industry by-product. The translational objectives of the project is to produce low cost paper based ceramic separator with high porosity, low thermal shrinkage, high mechanical strength, low internal resistance and excellent wettability to electrolyte and also better electrochemical performance in high energy and high rate lithium-ion battery.



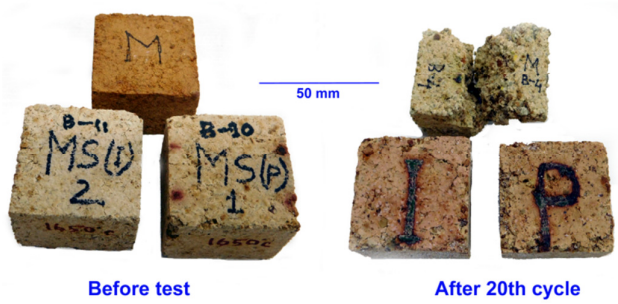
Setup for Paper-based Ceramic Separator

Superior refractory ramming mass for induction furnace for production of quality steel

CSIR-CGCRI has taken up a project to develop a suitable ramming mass refractory for induction furnace to produce high quality steel (through refining). This project is being carried out in collaboration with National Institute of Secondary Steel Technology (NIIST), MandiGobindgarh. The laboratory developed ramming mass compositions (magnesia based) have indicated promising results. These findings are being validated in progressively larger sized induction furnaces (5, 10 and 20 kg) with the collaboration of NIIST. These trials are being done with high fraction of DRI (80%) along with scrap iron, emulating existing industrial practice and still have exhibited promising corrosion and spalling resistance.

Once the technology is established, this superior ramming mass for induction furnace is proposed to be upscaled to the tune of 5 to 10 tons and industrial trial will be conducted in induction furnace of some of the secondary steel producers. Surge in Steel demand is anticipated due to several Government initiatives like, Housing for all, Make in India- infrastructure, construction, automobile, power sector etc. Also, the quality requirement of steel has been upgraded [P<0.035, BIS draft MTD 4(4923)] that necessitates superior refining process. This improved refractory lining is poised to impact

almost 1128 secondary steel manufactures using induction furnace, enabling them to manufacture such high quality steel.



Samples containing spinel (I & P) exhibit better thermal shock resistance than pure magnesite

Lab induction furnace after trial

Packaged Fiber Laser Modules for Industrial and Medical Applications

The project envisages development of commercial grade Packaged Fiber Laser Modules for Industrial and Medical Applications through indigenous technology.

Prototype of Fibre laser module

The deliverables of the project includes the demonstration of Laboratory prototype Pulsed 1 micron and CW 2 micronlaser modules including its commercial grade prototype packaging. Indigenous development of 1 micron Yb and 2 micron Tm- Fiber Laser Systems would open up avenues of the business opportunities and huge employment generation and creating manufacturing hub for areas like 3D printing technology, diamond processing, automobile industry, marking medical components, fragmentation of kidney stone etc.

SiAlON Insert for High Speed cutting of hard materials

The market for metal cutting inserts is huge while the development and supply of very advanced high speed machining tools is quite limited. SiAlON possessing suitable combination of tribo-mechanical properties is far advanced in terms of life, speed of cutting and surface finish as compared to conventional tool inserts such as Tungsten Carbide, HSS etc. Thus, there is enough scope to capture the present over expanded carbide tool market by much efficient SiAlON tool inserts in near future. This work primarily focused on the optimization of formulations and processing technique of some specified SiAlON ceramics based on which cutting tool inserts for ferrous, non ferrous metal machining as well as for wood cutting industries can be prepared. In addition to that the indigenously prepared SiAlON cutting tool inserts using the optimized technique developed by CSIR-CGCRI, Kolkata will be at least 6 to 8 times lower in price compared to those marketed by overseas manufacturers.Ball-on-Disc test using CSIR-CGCRI made SiAlON disc against commercial dense Si_3N_4 ball is shown in Fig. 2. Depending on test load, the results showed 15 to 100 times lower material loss of SiAlON disc compared to dense $Si_3N_4$are shown below in figures.

Development of Reaction Bonded Silicon Nitride Ceramic Radome

The technology is aimed at producing ceramic radomes for strategic applications.The project objectives are:Optimization and qualification of the green radome and sintered radome fabrication technology developed at CSIR-CGCRI, Generation of IP for the RBSN radome fabrication technology, Involvement of Indian industry partners through EOI for technology incubation and eventual transfer of technology (TOT) .

Fast Recovery trace moisture sensor and meter for detection of trace moisture present in transformer oil

Indigenous development of cost effective moisture meter and relative humidity sensor are expected to help the transformer oil industry. In addition to this particular application, such sensors are also having high demand in food processing, gas industry and edible oil manufacturing.This project is ,therefore, aims towards Development of gamma alumina based sol-gel derived thin film moisture sensor; todetect 1 to 50 ppm moisture level in transformer oil with fast response time along with design and fabrication of a microcontroller based moisture meter for measuring ppm level moisture present in transformer oil.Indigenously developed Alumina tubes and the fabricated sensor are shown below.

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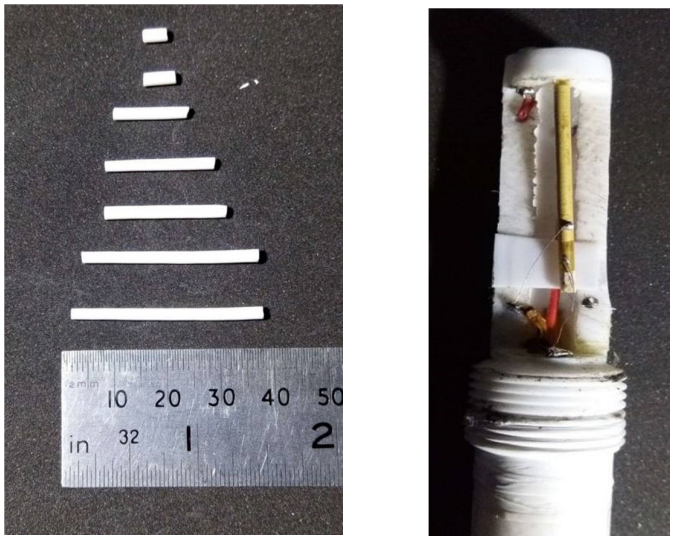
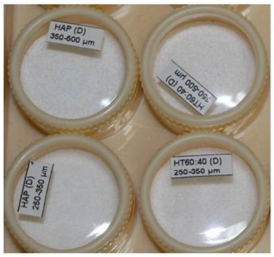


Indigenously developed Alumina tubes and the fabricated sensor using such tubes

Development of novel ion doped hydroxyapatite (HAp) by spray drying method and its utilization for plasma spray coating on medical implants with/without ion doping

The objectives of the project is to develop free flowing hydroxyapatite (HAp) granules with/without ion doping using spray drying method; andoptimize spray drying and plasma spraying process parameters to achieve desired microstructural, physical, mechanical and biological properties/characteristics.The technology is completely indigenous and adds to significant amount of time and cost saving. Cement less fixation of hip stem and shell, finger and other joints, for example maxilla and mandibular dental implants, spine screws, etc. will directly improve the quality of life in terms of implant life when used clinically. Significant improvement in quality of patients' life with HAp coated implants due to faster healing, increased bonding and overall increase in the service life.



Plasma sprayable HAp granules