द्विवार्षिक प्रतिवेदन

BIENNIAL REPORT

2011-13

सीएसआईआर–प्रगत पदार्थ तथा प्रक्रम अनुसंधान संस्थान, भोपाल

CSIR-ADVANCED MATERIALS AND PROCESSES RESEARCH INSTITUTE, BHOPAL

CSIR-AMPRI

सीएसआईआर–प्रगत पदार्थ तथा प्रक्रम अनुसंधान संस्थान (एम्प्री)
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Acknowledgement
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CONTENTS

निदेशक की कलम से

सीएसआईआर–एम्प्री की वर्ष 2011–12 से 2012–13 का द्विवार्षिक प्रतिवेदन प्रस्तुत करते हुए मुझे हर्ष का अनुभव हो रहा है। मैने डॉ. अनिल कुमार गुप्ता की स्वैच्छिक सेवानिवृत्ति के बाद 31 जुलाई, 2011 को सीएसआईआर–एम्प्री के निदेशक के पद का अतिरिक्त कार्यभार संभाला। सीएसआईआर–एम्प्री आते हुए मुझे इसके उद्देश्य को गहराई से जानने का अवसर मिला। संस्थान नीति संबंधी, उच्च कार्य निष्पादन वाले तथा सामाजिक अनुप्रयोगों हेतु अभियांत्रिकीय पदार्थों के विषय संबंधी अनुसंधान एवं विकास पर कार्यरत है। यह संस्थान सीएसआईआर– के अभियांत्रिकीय विज्ञान क्लस्टर के अंतर्गत कार्यरत है और इसे प्रगत अभियांत्रिक पदार्थो पर समूह में महत्वपूर्ण भूमिका निभानी है।

इस प्रतिवेदन में संस्थान के द्विवार्षिक अवधि की प्रगति का सार है। सीएसआईआर की ग्यारहवीं पंचवर्षीय योजना की परियोजनाएं सफलतापूर्वक पूरी की गयीं और बारहवीं पंचवर्षीय योजना की परियोजनाएं प्रारंभ की गयीं। धात्विक फोम, धातु मैट्रिक्स सम्मिश्र, विकिरण कवच पदार्थ तथा जियोपॉलीमर्स जैसे प्रगत पदार्थों पर हुए कार्यों से तथा जियोपॉलीमर्स जैसे प्रगत पदार्थो पर हुए कार्यों से प्रौद्योगिकी तैयार होने तथा हस्तांतरित किए जाने की आशा की जाती है। सीएसआईआर–एम्प्री टेकविल कार्यक्रम में भी अग्रणी है, जो कि सीएसआईआर– 800 योजना के अंतर्गत परिचालित किया जा रहा है। संस्थान द्वारा प्रतिष्ठित अनुसंधान पत्रिकाओं में अच्छी संख्या में शोधपत्र भी प्रकाशित किए गए हैं।

एम्प्री में सीएसआईआर की सत्तरवीं वर्षगांठ के समारोह की अध्यक्षता मध्यप्रदेश के राज्यपाल श्री रामनरेश यादव ने की। संस्थान को 5–6 फरवरी, 2013 को भोपाल में संसदीय राजभाषा समिति की दूसरी उपसमिति के दौरे के समन्वय तथा उनके समक्ष प्रस्तुतीकरण का अवसर मिला। विशिष्ट शोधकर्ताओं, शिक्षाविदों तथा विशेषज्ञों के व्याख्यानों के आयोजन से एम्प्री के ज्ञान भंडार में वृद्धि हुई। अनेक प्रतिष्ठित मंचों पर एम्प्री के वैज्ञानिकों की पहचान बनी।

सीएसआईआर–एम्प्री अनुसंधान चुनौतियों की दृष्टि से परिवर्तन के दौर में है। साथ ही इसे एक बड़े और व्यापक रूपांतरण हेतु एक अवसर के रूप में भी देखा जा सकता है। मुझे विश्वास है कि संस्थान अपनी एक जगह बनाएगा और महत्वपूर्ण अनुसंधान एवं प्रौद्योगिकी विकास में सहयोग करते हुए सीएसआईआर के वैश्विक रूप से प्रतियोगी तथा ज्ञान प्रदाता पदार्थ शोध संगठनों में से एक का स्थान प्राप्त करेगा।

मै प्रो. समीर के. ब्रह्मचारी, महानिदेशक, सीएसआईआर, डॉ. जी सुन्दरराजन, अध्यक्ष, अनुसंधान परिषद् तथा अनुसंधान परिषद् के सदस्यों का उनके मार्गदर्शन तथा सहयोग के लिए आभार प्रकट करता हूँ। मैं सीएसआईआर–एम्प्री के सभी सदस्यों के अथक प्रयासों की सराहना करता हूँ। अंत में मैं इस अवधि में भोपाल में नियमित कार्यों को देखने के लिए डॉ. नवीन चंद्रा (अगस्त 2011–जुलाई, 2012) डॉ. नवीन चंद, (अगस्त 2012–सितम्बर 2012) एवं श्री पी.डी. एकबोटे (अक्टूबर 2012, अप्रैल 2013) द्वारा दिए गए अमूल्य सहयोग का धन्यवाद करता हूँ।

प्रो. बी. के. मिश्र
निदेशक, अतिरिक्त प्रभार
सीएसआईआर–एम्प्री

From Director's Desk

It is a pleasure to present the Biennial Report (2011-12 to 2012-13) of the CSIR-AMPRI. I took over the additional charge as Director of CSIR-AMPRI on July 31, 2011 consequent upon the voluntary retirement of Dr Anil K Gupta. CSIR-AMPRI is mandated to carry out research and development on engineering materials for strategic, high performance and societal applications. The institute comes under the engineering sciences cluster of CSIR and has a major role to perform in the group on next generation engineering materials.

The report summarises progress attained by the Institute during the period. The CSIR XI Plan projects were successfully completed and XII Plan projects started. The work on advanced engineering materials such as metallic foams, metal matrix composites, radiation shielding materials, geopolymers is expected to lead to joint technology development and technology transfer. CSIR-AMPRI is also a forerunner in the TECHVIL program which is being operated under the CSIR-800 scheme. Significant research contributions also include a good number of research publications in prestigious research journals.

CSIR@70 celebrations at AMPRI were graced by the presence of H.E. The Governor, Madhya Pradesh, Shri Ram Naresh Yadav. The Institute had the privilege to coordinate and participate in the Parliamentary sub-Committee meeting on February 5-6, 2013 to review implementation of Rajbhasha. Several lectures by eminent researchers, academicians and experts were held that enriched the knowledge cove of AMPRI. Scientists of AMPRI received recognitions at prestigious fora.

CSIR-AMPRI is going through a period of transition in terms of R&D challenges and growth. This also presents an opportunity for a great and far reaching transformation. I am sure that the institute will carve a niche and make significant research and technology development contributions and attain a position as globally competitive and knowledge intensive materials research organization of CSIR.

I take this opportunity to gratefully acknowledge the guidance and support from Prof. Samir K. Brahmachari, DG, CSIR and Dr. G. Sundararajan, Chairman Research Council, AMPRI and distinguished members of RC. I deeply appreciate the untiring efforts by all members of CSIR-AMPRI. Finally, I must acknowledge the valuable support extended by Dr. Navin Chandra (Aug 2011-July 2012), Dr. Navin Chand,(Aug. 2012-Sept. 2012) and Shri P. D. Ekbote (Oct 2012-Apr 2013) for looking after day to day operations at AMPRI, Bhopal during this period.

Prof B. K. Mishra
Director, Additional Charge
CSIR-AMPRI

VISION

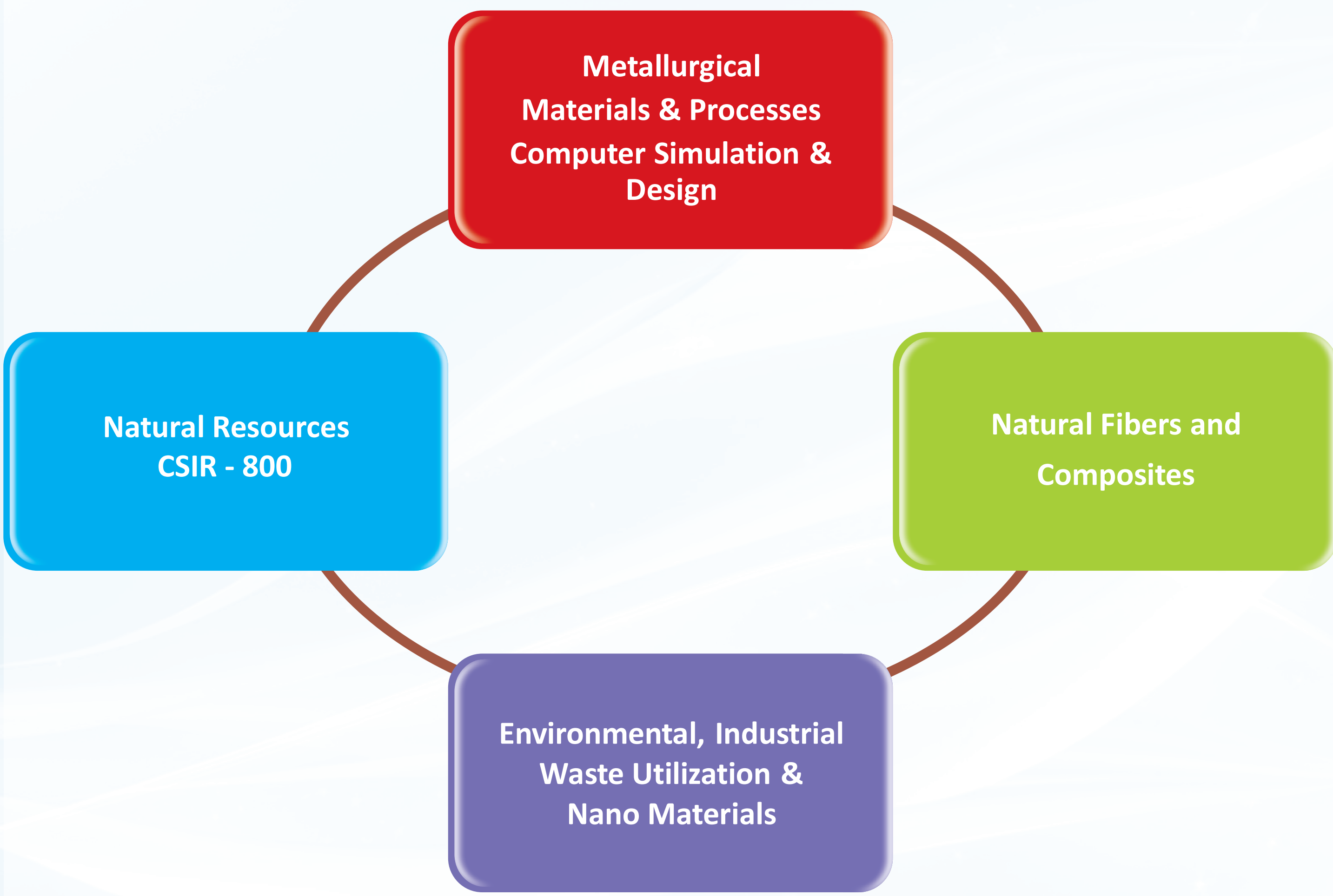
CSIR-AMPRI, Bhopal is committed to develop innovative, cutting edge, internationally competitive, energy efficient and environment friendly technologies/products in the area of advanced materials for societal benefits and to contribute to the Nation's Economy.

MANDATE

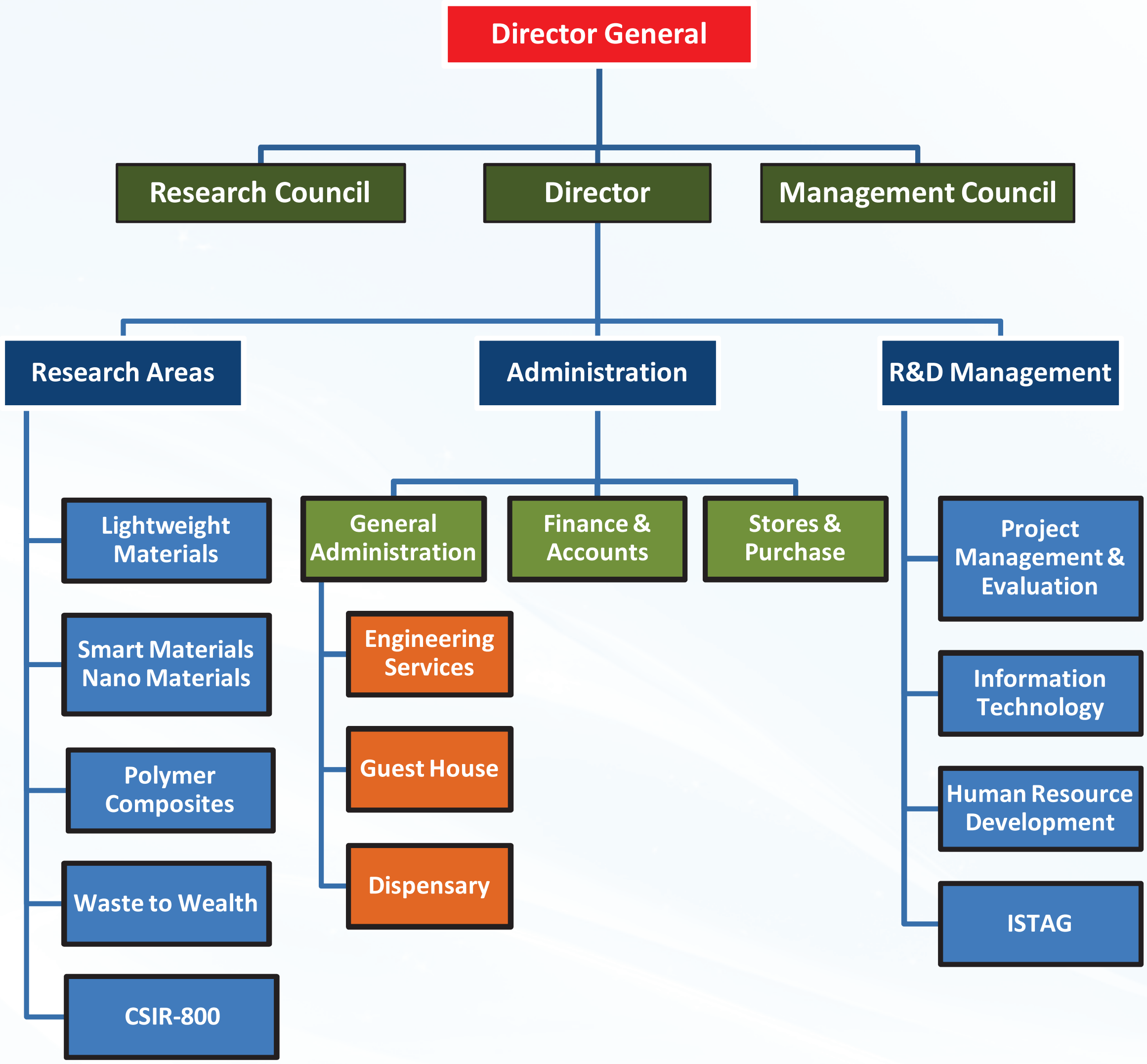
- Research & Development on Engineering Materials for Strategic High Performance and Societal Applications
- Materials, Processes and Technology Development for Components/Products for a variety of Engineering Materials including Metals & Alloys, Composites, Polymers, Building Materials and Waste to Wealth.
- To Undertake Consultancy, Sponsored, Grant-in-aid, Network & other National, International Projects from both Public and Private Sectors in Above Areas.

Core Expertise

R & D Activities



ORGANIZATION CHART



EXECUTIVE SUMMARY

Research Publications

YEAR	SCI	NON SCI	TOTAL
2011	35	7	42
2012	42	7	49

Budget (Rs. In Lakhs)

CSIR-AMPRI Budget

Year	Plan	Non-Plan	CSIR NWPs
2011-12	838.158	755.921	347.633
2012-13	776.221	852.854	144.107

Human Resources

Staff Position (as on March 31, 2013)

Group IV	41
Group III	24
Group II & I	25
Administration	37
Floating Staff JRF/SRF/RA/PA/Y.Sct.	19

Patents

Indian Patents in force	:	***15***
Foreign Patents in force	:	***2***
Patents Pending	:	***20 (Indian)***
	:	***1 (Foreign)***

Ongoing Projects

CSIR XIIth Plan Projects

1. Novel Energy Effective Metallic Materials for Engineering Applications (Nodal Lab: CSIR- AMPRI)
2. Design and Development of Thermo Responsive & Magnetic Shape Memory Materials and Devices for Engineering Applications - Supra Institutional Project
3. Advanced Ceramic Materials and Components for Energy and Structural Applications (CERMESA) (Nodal Lab: CSIR-CGCRI)
4. Development of Novel CSIR Technologies for Manufacturing Tailored and Patient-Specific Bioceramic Implants and Biomedical Devices at Affordable Cost (BIOCERAM)(Nodal Lab : CSIR-CGCRI)
5. Molecules to Materials to Devices (M2D) (Nodal Laboratory:CSIR-NIIST)
6. Development of Spatial Decision Support Systems (SDSS) and Hydrological Modelling for Assessment and Management of Nutrient and Pesticide Pollution Load as NPS pollution in Agricultural Watersheds (Nodal Lab:CSIR-NEERI)
7. CSIR-Technology Demonstration Centre (CSIR-TDC) for Improving Rural Livelihood in the State of Madhya Pradesh
8. CSIR Knowledge Gateway and Open Source Private Cloud Infrastructure (KNOWGATE), (Nodal lab : CSIR-NISCAIR)

Grant-in-Aid		**Rs. Lakhs**
1	GAP-0066-DST-11 Development and Optimization of Processes for Permanent Hydrophilic and Hydrophobic Surface Coatings with Nano Particles for Multifunctional Finishing of Textiles	Rs 3.88
2	GAP-0067-NRB-11 Development of Cast In-situ Cu-based Composite for Naval Applications	Rs. 34.00
3	GAP-0068-BRNS-12 Development of Design Mix of Radiation Shielding Concrete using Advanced Material	Rs. 27.36
Sponsored		
1	SSP-0039-BHEL-13 Use of High Tensile Steel Plates for Manufacturing Pole End Plates	Rs. 20.00

Projects Completed 2011-13

S. No.	Title
1.	GAP 0057-BRNS-08 Development of Lead Free, Multi Component Composite Materials using Conventional and Advance Ceramic Route for Simultaneously and Synergistically Shielding of Gamma and Neutron Radiation
2.	SSP 0037-BHEL-10 Comparison of Processing Route and the Material for Producing Cost Effective Spider Key Bar Profile with Improved Property
3.	SSP - 0038 - BHEL - 12 Development of Fabricated Shaft for Hydro Generator
4.	NWP 0028 Development of Advanced Light Weight Metallic Materials for Engineering Applications AMPRI-NIIST-NML-NPL
5.	NWP 0029 Non-oxide Ceramic Based Advanced Structural Materials for Application in Armours CGCRI-AMPRI-SERC
6.	NWP 0035 Nanomaterial and Nanodevices for Application in Health and Diseases CCMB-CEERI-AMPRI-CECRI
7.	NWP 0037 Discovery and Preclinical Studies of New Bioactive Molecules (Natural and Semi-Synthetic) & Traditional Preparations IIIM-CIMAP-CDRI-NBRI-IICB-IICT-AMPRI-NCL-NEIST-IHBT
8.	NWP 0046 Sustainable Development and Management of Water Resources in Different Problematic Terrain NGRI-AMPRI-NEERI
9.	NWP 0051 Nanostructured Advance Materials NML-AMPRI-CEERI-CGCRI-CMERI-IMMT-NAL-NCL-NPL
10.	RSP 0001 Sisal - Potential for Rural Development and Green Technology
11.	RSP 0002 Dissemination and Showcasing of Rural Technologies
12.	GAP - 0061 - MPCST - 09 Development of Noise Absorbing Material (Noise Barrier) from Industrial Rubber Waste for Use in Engineering Applications

NEW FACILITIES

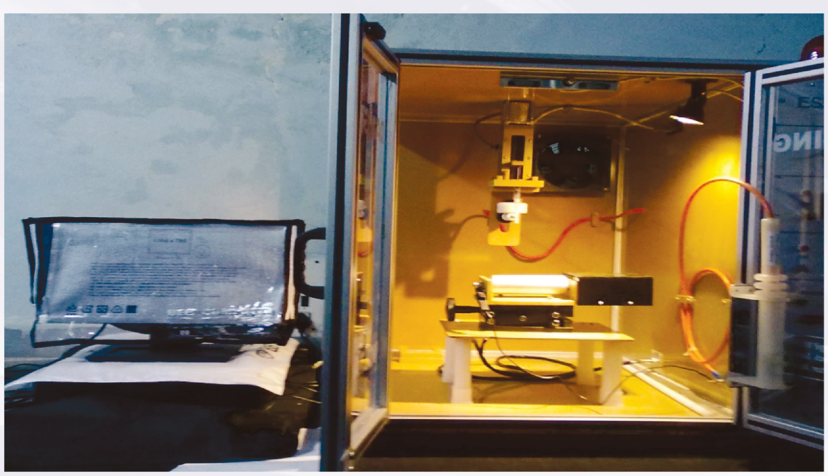
FESEM

FEI- Nova nanosem 430 with Oxford make EDS & EBSD Facility, Resolution – 1nm at 15KV,Max. Mag.8.00 Lakhs, EDX: elements detection Be and above, EBSD: Texture, Orientation mapping, grain boundry mapping.

Universal Testing Machine

Universal Testing Machine with a loading capacity of 100 KN load capable of conducting tensile, compressive, fatigue tests upto 600 ^{0}C

Electro Spinning Machine



For preparation of polymeric, polymer blend and filled polymer based nanofibres

RESEARCH & DEVELOPMENT ACTIVITIES

Metallic Materials for Automotive and General Engineering Applications

During the period of the report, work was carried out on lightweight materials such as aluminium foam core sandwich panels, high pressure die casting of aluminum alloy matrix composite based brake drum, titanium foam, powder metallurgy based metal matrix composites, equi – channel angular processing/extrusion, and hot deformation behavior of magnesium alloys. CSIR-AMPRI initiated the XII Plan project on Novel Energy Effective Metallic Materials for Automotive and General Engineering Applications.

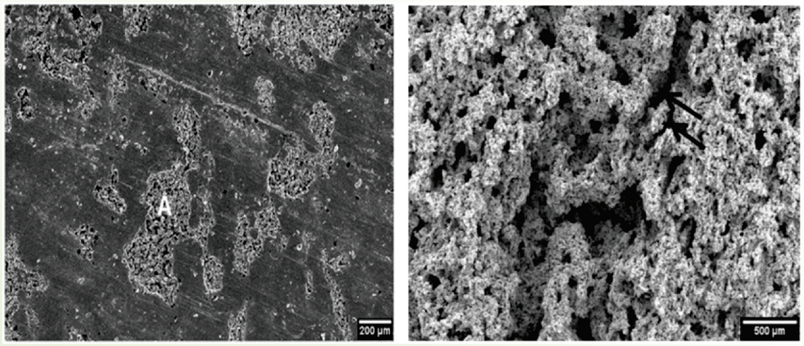
Aluminium Foam Core Sandwich Panels

Closed pore Al foam core sandwich panels were successfully fabricated by using a specially designed polymer filled with cenosphere and fly ash based filler through vibration assisted liquid phase bonding method. Main objective of the program was to make Al foam core sandwich panels for vibration and noise attenuation applications. Close pore Al foam produced by melt route was used as the core enclosed with polymer sheet filled with fly ash. The sandwich panels were tested for vibration damper and noise attenuation. The noise attenuation test was carried out at ARAI Pune. The results were encouraging and could be used for making panels for different engineering applications such as automotive engine cradles for vibration and noise attenuation purpose.

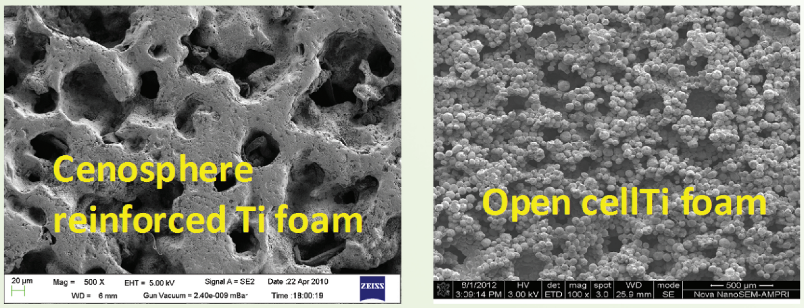
Closed and Open Cell Titanium Foam for Engineering Applications

Metallic foams belong to a special category of materials having an interesting combination of engineering properties. These properties are imparted to the material system through the generation of pores in the alloy matrix. Their specific features include high damping capacity, noise and vibration attenuation, thermal insulation characteristics etc. Accordingly, there lies a lot of potential applications in aerospace, automobile, chemical and other engineering sectors in the form of impact energy absorbers, vibration and noise attenuators, heat exchangers and catalyst substrates depending on the nature, content and morphology of the pores. Ti foams have the potential for use in environments encountering corrosion and heat. They have also emerged as a potential replacement to the conventionally used ferritic stainless steels in biomedical applications.

Ti foam samples have been developed at CSIR-AMPRI, Bhopal by powder metallurgy (P/M) route using space holder technique. Attempts have been made to prepare Ti foam containing open and isolated pores with varying pore morphology, content and mode of pore distribution. Experiments carried out suggest that Ti foam could effectively be made employing urea particles as the space holder material needed for the creation of porosity in the material system. The porosity level generated in the foams was 45-65% with a pore size range of 1-10 µm, density of 1.5-2.4 g/cc, plateau stress of 35-60 MPa, energy absorption capacity of 20-35 MJ/m^3 and elastic modulus of 8-24 GPa. Open cell Ti-foams with a porosity range of 65-80% with pore cell wall thickness of 200-300 µm and pore size ranging from 500-700 µm were also synthesized by the P/M route. The study showed that the pores began to form an interconnected network when the porosity level increased beyond 50 vol. %. The plateau strength of the open-cell foam decreased from around 58 to 35 MPa when the porosity level was raised from 55 to 65%. These foams have the potential for use in applications requiring blast resistance, damping and energy absorption at high temperatures and in adverse environments.



FESEM Micro structures the Ti-foam Produced b space holder Technique

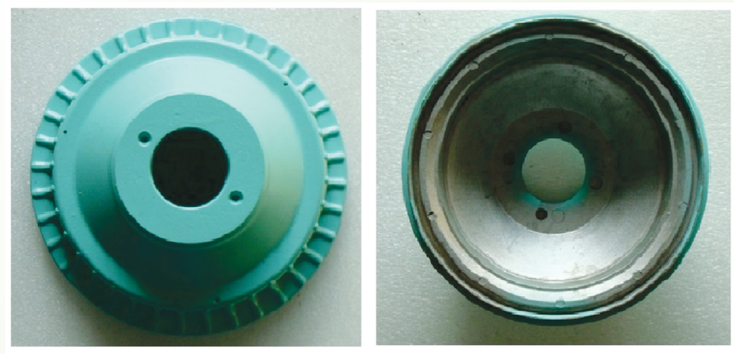


Cenosphere reinforced Titanium Foam

High pressure die cast MMC brake drum

Automotive components can be best lightened through innovative design strategies and by employing lightweight materials. One such component in the suspension area of a vehicle is brake drum which presently is made of cast iron. CSIR-AMPRI is actively researching in the development of aluminum alloy based metal matrix composite (MMC) brake drum. Aluminium MMC brake drums were initially made by gravity die casting technique. However, brake drums were made by high pressure die casting technique to achieve defect free and consistent products. The advantages of pressure die casting components as compared to the gravity cast one are excellent dimensional

High Pressure Die Cast Al MMC
Automobile Brake Drum

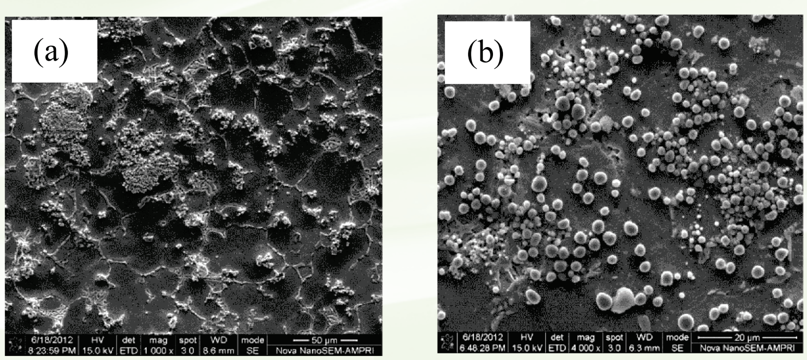


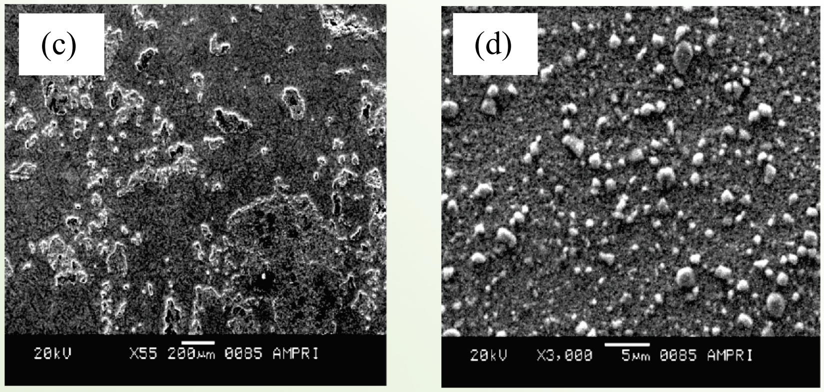
High Pressure Die Cast Al MMC brake drums

accuracy, smooth cast surfaces, thinner walls and near net shaped castings. CSIR-AMPRI has a 400 T automated high pressure die casting machine with inbuilt spray coating system. A computer is interfacesd with the unit to record the application of pressure at each stage. Main objective of the program is to make aluminium alloy metal matrix composite brake drums conforming to the dimensions of brake drums supplied by the major automobile industries. The processing parameters such as the plunger diameter, solidification time, pressure etc. were optimized for defect free production of brake drums of size 165 mm diameter. Al alloys such as LM6, LM25 were used to make the drums.

In-situ Al- and Cu-based composites

Composites containing ultrafine (1-5 µm) TiC particles were successfully synthesized employing a combination of Powder Metallurgy and Liquid Metallurgy techniques. The process involved preparation of pellets of Ti+C by powder mixing and compaction processes followed by allowing the Ti+C to react within the molten matrix when the pellets were added. This enabled generation of fine TiC particles within the matrix with a fairly good degree of homogeneity of distribution and sound dispersoid/matrix interfacial bonding and improved mechanical and tribological properties over that of the corresponding matrix. Studies were undertaken to generate and disperse ultrafine (0.2-1.4 µm) TiC particles in Cu matrix. The samples were prepared employing addition of TiC particles to the powder matrix followed by mechanical milling over a range of durations, cold compaction and vacuum sintering. The effects of aluminium addition and the contents of Al & TiC on microstructural features, particle fragmentation, crystallite size, lattice strain, densification behaviour and hardness of the (sintered) samples have been analyzed. The composites consisted of uniformly distributed (fine) TiC particles with sound TiC/matrix interfacial bonding. Increasing aluminium and TiC contents led to a better chemical homogeneity in the composites. Addition of Al and TiC to Cu brought about increased hardness wherein aluminium addition became more effective at higher TiC contents. Moreover, densification behaviour was affected in a mixed manner in the presence of TiC and aluminium.

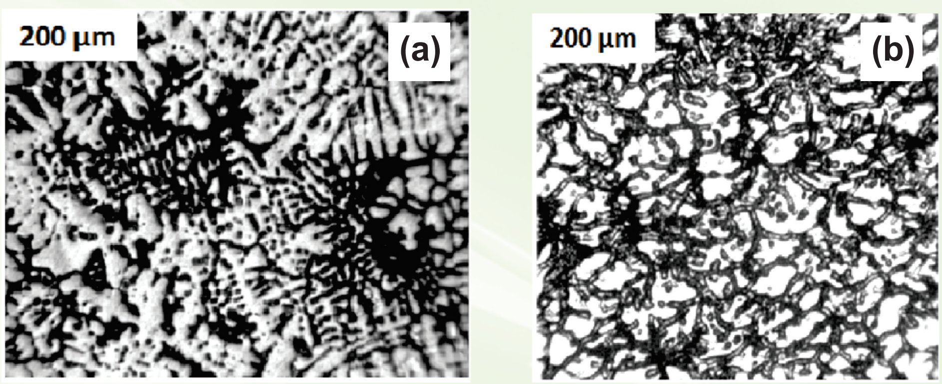




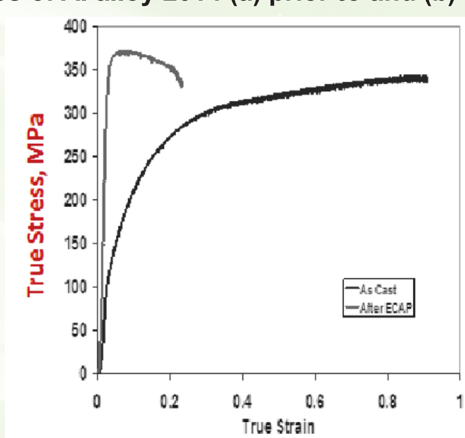
Microstrutures of (a&b) AL 2014 alloy-10TiC and (c&d) Cu-10Al-10TiC in-situ comosites

Equi- Channel Angular Processing/Extrusion

CSIR-AMPRI carried out studies pertaining to the response of Mg and Al alloys when processed employing ECAP. The objective is to generate ultrafine microconstituents and to realize superior mechanical properties and performance in the alloy system. Preliminary studies have been carried out so far to understand the influence of ECAP on the microstructural features and mechanical properties of a 2014 Al alloy. Breaking of the dendritic structure and initiation of the generation of equiaxed grains was noted after subjecting the alloy to ECAP employing a die with die angle. 90° and corner (fillet) angle 20°. This change in the microstructural features of the alloy was also reflected in terms of enhanced tensile properties after processing using ECAP.



Microstructural features of Al alloy 2014 (a) prior to and (b) after single pass ECAP

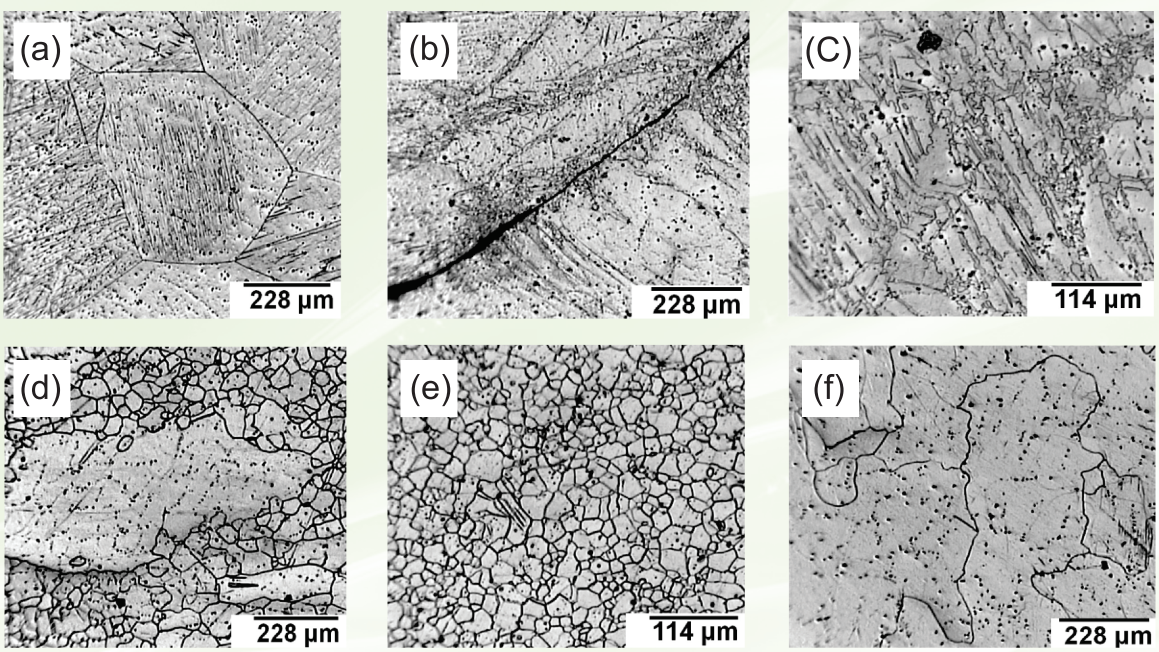


Tensile properties of the Al 2014 alloy prior to and after processing through ECAP

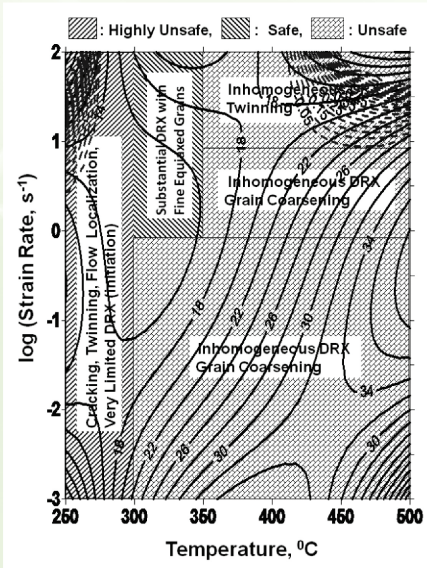
Hot deformation behaviour of Mg alloys

Mg alloys have a number of potential applications in automobile, aerospace and other engineering applications. Wrought Mg alloy components are very much desired to satisfy the requirements of higher strength and thin walled products. Deformation processing of Mg alloys becomes quite critical in terms of the selection of optimized processing parameters like degree and rate (termed as strain and strain rate) and temperature of deformation. The severity of the problem increases further in the case of materials like Mg alloys in view of their limited/inferior deformability characteristics that emerges from their specific (hexagonal close packed) crystal structure. Other controlling parameters in this context include starting material characteristics (chemical composition, microstructure, prior processing history etc.). These parameters are generally optimized through trial and error studies that become expensive and time consuming. Dynamic materials modeling (DMM) becomes quite helpful in this context wherein optimization is done based on the flow stress determined through simple compression tests over a given range of temperature and strain rate for a fixed strain.

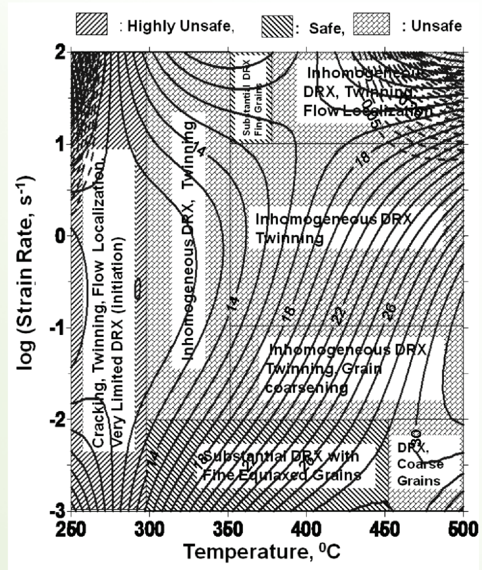
In view of the above, CSIR-AMPRI initiated studies on the influence of chemical composition and resulting microstructural features on the deformability characteristics of Mg alloys. Safe and unsafe domains (temperature and strain rate) of deformation have been determined by generating process and micromechanism maps for the Mg alloys. The work involves a systematic analysis and understanding of various microstructural events taking place during deformation in different combinations of experimental parameters in order to more precisely assess various mechanisms of material deformation over the entire range of deformation conditions which could ultimately lead to a more effective and reliable optimization of the processing parameters for the samples.



Microstructural features of pure Mg in (a) as cast and (b-f) deformed conditions revealing (a) as cast coarse grains and (b-f) cracking, twinning, inhomogeneous discontinuous recrystallization (DRX), uniformly recrystallized (DRX) grains and grain coarsening after deformation at different combinations of temperature and strain rate



(a)



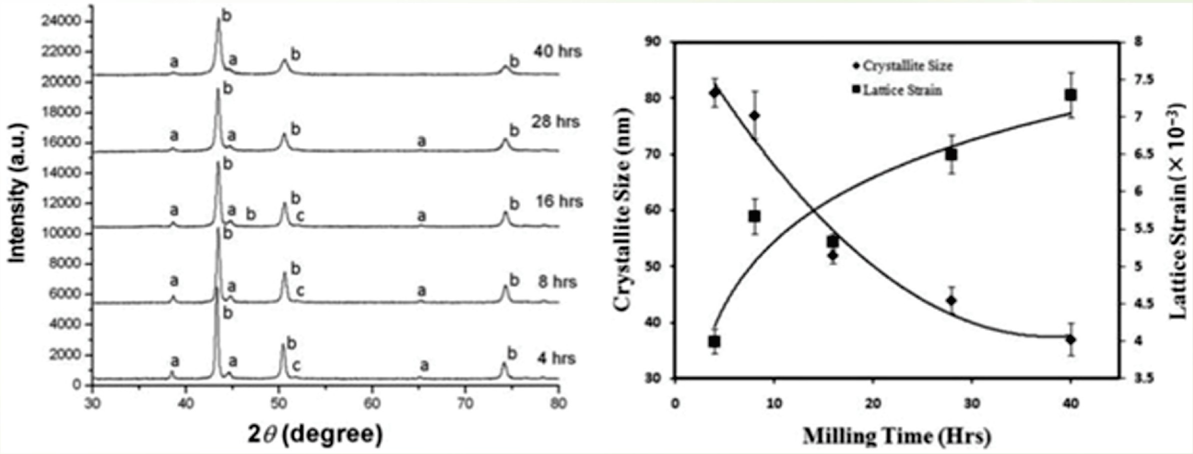
(b)

Superimposed images of process and micromechanism maps at 0.5 strain for (a) Pure Mg and (b) Mg-3Al-0.5Ce alloy

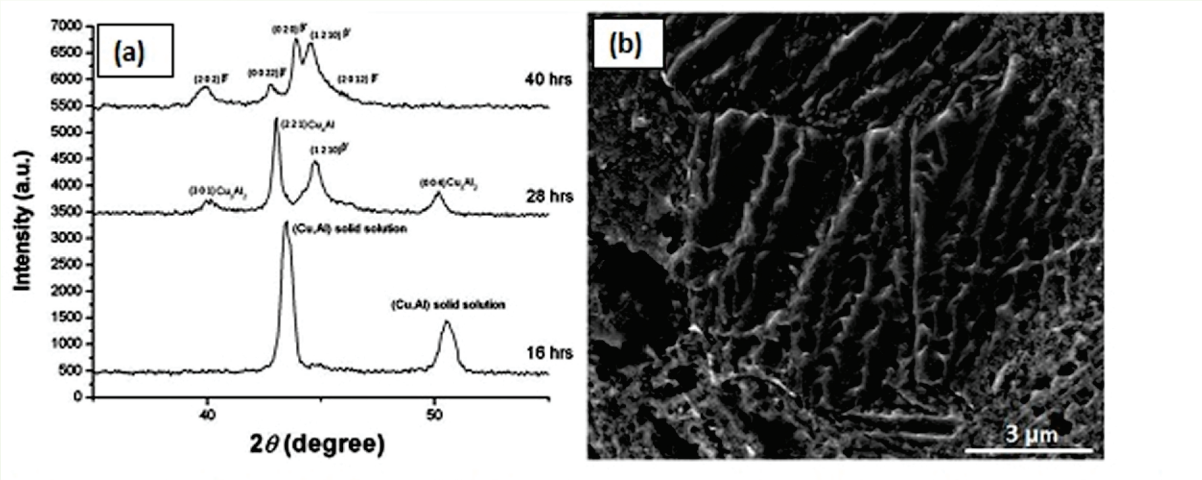
Design and Development of Thermo Responsive & Magnetic Shape Memory Materials and Devices for Engineering Applications

CSIR-AMPRI initiated studies on Cu-Al based shape memory alloys. An attempt has been made to synthesize the alloy system employing powder metallurgy (P/M) technique. The effect of milling (mechanical alloying) duration on the properties/characteristics of a Cu–Al–Ni–Ti shape memory has been studied. The idea was to optimize the duration of milling (mechanical alloying) to obtain chemical homogeneity as well as shape memory properties in the processed material without undergoing extensive post homogenization treatment. The martensitic structure was noted to evolve in the powder mix milled for at least 16 hrs, whereas complete transformation to martensite occurred after milling for 40 hrs. Interestingly, the dissolution of alloying elements (to form the β phase prior to the formation of martensite) was noted to complete partially only during mechanical alloying for 40 hrs and remaining during subsequent sintering for 1 hr. The hot pressed compacts of the powders milled for 40 hrs were chemically homogeneous and consisted of fully martensite phase, which is essential for the realization of shape memory properties. Fine-grained hot pressed compacts with grain size ~7 µm were obtained from the powder mix milled for 40 hrs. They also revealed complete formation of self-accommodated type β martensite along with uniform distribution of alloying elements. They also revealed almost 100 % shape recovery at the applied pre-strain levels of 1 and 2%.

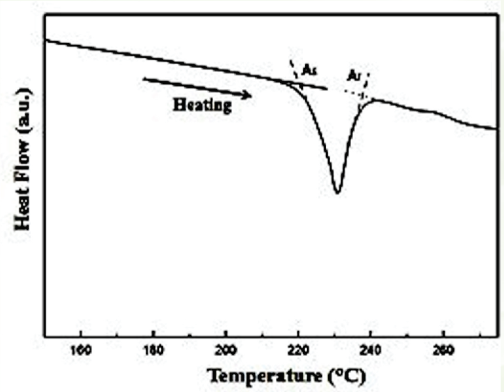
In an attempt to improve recovery stress and switching efficiency of Shape Memory Polymers, they will be reinforced uniformly with Carbon Nano Tube (CNT)/nano particles. Polyurethane series of Shape Memory Polymers have been initially chosen to be dispersed with carbon nano tubes [CNT]. An experimental setup has been developed for making SMP specimens for testing and evaluation. The system is capable of making bubble/void free casting of PU. Two important quantities that are used to describe shape memory effects are the strain recovery rate (R_r) and strain fixity rate (R_f). The strain recovery rate describes the ability of the material to memorize its permanent shape, while the strain fixity rate describes the ability of switching segments to fix the mechanical deformation. An arrangement was designed and fabricated in CSIR-AMPRI to determine possible strain recovery rate and strain fixity rate. The DSC plots of the materials showed the peaks required for SM properties.



(a) XRD spectra of the milled powders [a: Aluminium, b: Copper and c: Nickel] and (b) Crystallte size and lattIce strain as a function of milling duration



(a) XRD spectra of sintered and quenched compacts prepared from the powder after 16, 28 and 40 hrs of milling showing peaks corresponding to martensitic phase and (b) fully martensitic microstructure attained in the sample processed after 40 hrs of milling



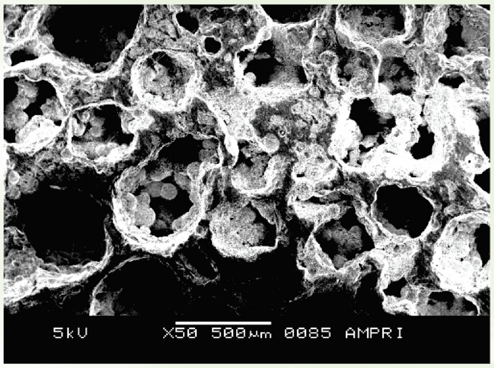
DSC of 40:I milled powder compacts

Development of Advanced Composite Armor for Protection Against Medium Caliber Threats

The project is aimed to develop composite layer armor to reduce the weight of the ordnance vehicles in protecting against medium caliber threats. The work has been sponsored by Ordnance Development Council (ODC), OFB, Min. of Defence. The main objective of the project is to develop a lightweight protection system for ordnance vehicles against medium caliber threat (180-200 kJ). Size of the armor panel will be 1000 mm x 500 mm. These composites are layered hybrid and consist of metal, ceramic and other materials like polymers, rubber and glass fibres. CSIR - CGCRI along with partner laboratory, CSIR- SERC has demonstrated the ability to produce an effective prototype armor panel for protection against small caliber threats in the XI Five year plan network project. Novel material design approach like multilayer ceramic structure, nano-composites like SWNT dispersed AlN and SiC and ceramic particulate composites like TiB_2- Al_2O_3 is being considered in the project. Main approach of the project will be to optimize the structure of the test panel from the choice of different materials like metal, ceramic and others for the effective reduction of weight of the panel over the conventionally used material i.e. armor grade 4340 steel. The involvement of CSIR-AMPRI is to develop a strong and tough Al alloy plate which would act as a backing material.

Bioactive Ti-Foam

HAP coated Ti-foams were developed by CSIR-AMPRI with an aim to use them as bone scaffolds or bone replacements. Highly porous Ti-foam was made and spin coated with the suspension of HAP solution. After drying, the HAP-coated Ti-foam was sintered. The thickness of HAP coating could be controlled by controlling the spinning speed and density of HAP in the solution.



Microstructure of HAP coated Bio-active Ti-foam (Porosity : 75%, Cell Size : 200µm)

Molecules to Materials to Devices (M2D)

The main objective in this case is the development of novel functional materials projectable as sensors for the continuous and reversible reporting of various analysts. CSIR-NIIST, Trivandrum; CSIR-NCL, Pune; CSIR-IICT, Hyderabad; CSIR-CECRI, Karaikudi; CSIR-NEIST, Jorhat; CSIR-CSMCRI, Bhavnagar; CSIR-CLRI, Chennai and CSIR-AMPRI, Bhopal are carrying out the project. CSIR-AMPRI has expertise for the development of analytical separation methods and low level detection of environmental toxicants and bio-molecules. It is proposed to develop microfluidic support for the separation and detection of biomolecules and environmental toxicants. Following are the objectives of CSIR-AMPRI:

1. Microfluidic separation and detection of bio–molecules for identification of different diseases.
2. Characterization of fluorescence and electroactive molecules developed by NIIST, NCL, CECRI, CSMCRI, CLRI, NEIST, IICT and their application for detection of biomolecules and toxicants.

Advanced Non-Toxic Radiation Shielding Materials

Red mud based non toxic X-ray shielding materials have been developed through ceramic processing route and tested for attenuation of X-rays of different energies and compared with those of conventional concrete and lead. It has been observed that Half Value Thickness, (HVT) of the developed material has been reduced to as low as lead (0.085 cm) for 100 kV diagnostic X-rays. A US Patent (US 7,524,452 B2) has been granted to CSIR-AMPRI, for this material.

There is an urgent need from Nuclear Power Plants for making radiation shielding concrete all over the world. By the year 2032, India has planned to construct 39 Nuclear power plants producing 45000 MW power. The demand of shielding aggregates is about 6.12 million tons. Conventionally, hematite ore is used as shielding aggregate. It is a non replenishable natural resource and is used for making iron whereas red mud based aggregates will be of great significance for the shielding purpose.

Board of Research in Nuclear Sciences (BRNS), Mumbai has sponsored an R&D project for the development of a design mix of irradiation shielding concrete. Under this project, CSIR-AMPRI has developed a novel process for making red mud based multi component- multi phase shielding aggregates by heat treatment of red mud with barium containing compounds and other additives. Development of a design mix for making irradiation shielding concrete utilizing these developed aggregates is under progress.

Nano-Structured Materials, Nano-Composites and Nano-Fibres

Some of the R&D activities and significant contributions of CSIR-AMPRI in the development of nano-structured materials for engineering applications include the development of nano powders for tribological applications and nano alumina /zirconia coatings and polymeric nano composites. The materials were prepared and characterized for their microstructural features and mechanical properties. Nano-structured materials, polymeric nano-composites and polymeric nano-fibres have better strength along with other useful properties. Different routes were adopted to develop nano-composites such as sol-gel approach and electrospinning.

Nano Powders of Refractory Carbides

CSIR-AMPRI is actively engaged in the synthesis of nano-sized powders for engineering applications. For tribological applications, nano-size powders of refractory carbides viz., ZrC, TiC and SiC were synthesized through chemical route. Following emulsion/sol gel routes, the metal bearing precursors were prepared and mixed with soot derived carbon nano-spheres followed by high temperature reaction (1300-1600^{o}C) under controlled environment to obtain the respective carbide nano powders. The physical, chemical and mineralogical characterization confirmed that silicon carbide was 3C-SiC having crystallite size of ~ 17 nm and particle size 30-50 nm. Similarly, TiC was observed to contain nano rods as well as nano particles. The cubic TiC particles had a crystallite size of

~ 35 nm and particle size in the range of 60-140 nm. The cubic Zr C nano particles were observed to have a crystallite size of ~24 nm with particles in the size range of 25-50 nm.

Nano-Alumina/Zirconia Coatings

Ceramic nano structured coatings containing alumina and zirconia have been found to be corrosion and oxidation resistant in severe working environments comprising of aqueous and non-aqueous systems at room and elevated temperatures. Sol-gel technique has been found to be effective towards the formation of such coatings on metallic substrates for different engineering applications. Sol-gel coatings are based on the stable dispersion of colloidal units (size : 10-20 nm) in liquids. The sol, when applied on the substrates, wets the surface of the substrate and partly adheres onto it. Thereafter, the sol reacts with moisture in the atmosphere and undergoes hydrolysis and condensation forming a xerogel. The xerogel densifies by thermal treatment that finally forms a compact and adherent coating. The coatings formed by sol-gel process are generally homogenous and crack-free in nature. The coatings are applied by dipping, spinning or spraying on the substrate. This method of coating development is quite feasible since large and complex shaped substrates like pipes, tubes, rods and fibres can be coated more easily compared to coatings developed by other conventional methods. Successful generation of coatings requires the optimization of a number of material and processing parameters. CSIR-AMPRI carried out studies in this direction to develop coatings on steel and Al substrates and evaluated properties like corrosion and oxidation resistance. Significant improvement in corrosion and oxidation resistance has been observed.

PMMA/TiO_2 Nano Composites

Transparent thin films of nanotitania filled poly methyl methacrylate (PMMA) composites were synthesized at CSIR-AMPRI. The effect of nano titanium dioxide (TiO_2) loading on PMMA morphology was studied by using scanning electron microscopy (SEM). In the pure PMMA thin film, bowl shaped structures were uniformly distributed, which deformed on incorporation of TiO_2 nano particles. These nano composites exhibited enhanced optical and thermal properties. PMMA film exhibited a microstructure having bowls distributed uniformly. These spherical cut bowls have cavity. TiO_2 has strong tendency to agglomerate. These particles agglomerated in the cavities of bowl and distorted the bowl shaped structures. Deformation of bowl structures is explained on the basis of increase in the micro-hardness of the composite film on the incorporation of inorganic TiO_2 phase. UV-visible absorption spectra of plain PMMA film and PMMA films doped with titanium dioxide nano particles showed intense absorption in the UV region and there is no adsorption observed in the visible region. Incorporation of TiO_2 in PMMA increased the midpoint glass transition temperature (Tg) to 86.7 from 84.8°C. This shows the improvement in Tg of PMMA.

Nano Cellulosic Fibre Obtained from Sisal Fibre Reinforced Polyolefin

Nano cellulose fibres present in sisal fibre have been isolated. Other components present in sisal fibre such as lignin, pectin and wax were removed in the process. These separated nano cellulosic fibres were reinforced in some olefins namely low-density polyethylene (LDPE), linear low-density polyethylene (LLDPE) and polypropylene (PP) by melt mixing technique. Nano cellulose fibre reinforced polyolefin composites were developed by varying the concentration of nano cellulose fibres obtained from sisal fibres. Mechanical properties of these composites were evaluated.

Decision Support Systems and Hydrological Modeling for Assessment and Management of Agricultural Watersheds

The proposed project deals with development of Spatial Decision Support Systems (SDSS) for assessment and management of nutrient and pesticide pollution load as Non-point Source (NPS) pollution in agricultural watersheds. SDSS are user-friendly software tools which support interactive GIS mapping, modeling for rainfall-runoff and NPS pollution assessment with decision making capability. Inter-linkage of mathematical models with geographical information system facilitates consideration of spatial variability in land-use, soil, rainfall and other features of the study area. Simulation and modeling will be undertaken to quantify the NPS pollution load generated and prioritize the watersheds for the management of NPS pollution. Multi-criteria Decision Making approach will be used for the selection of best management practices.

Demonstration Programmme on Sisal Fibre Technologies

Demonstration programme on sisal cultivation and harvesting to the villagers of Gaipathwadi and Delwani of Ahemdnagar, district Maharashtra was organized on 16-2-2012

Demonstration programme on Sisal cultivation, extraction, processing and value addition including Buffing wheel for the villagers at shrigonda of Ahemdnagar district was organized on 18-2-2012

Demonstration programme on Sisal cultivation, extraction, processing and value addition including Buffing wheel for the villagers at shrigonda of Ahemdnagar district was organized on 19-2-2012. During the programme live demonstration of sisal fibre extraction from leaf through raspador machine was given.

Establishment of Tech-Vil in Madhya Pradesh under CSIR-800

CSIR-800 aims to provide better life to 800 million people in the country through S & T solutions/ interventions in several areas of their activities such as value added agriculture, waste utilization, sustainable energy availability, low cost housing, affordable health, clean drinking water etc. In pursuance of this goal, CSIR intends to setup “Tech-Vil” wherein, efforts would be made to provide technological solutions keeping a particular village as nodal point. CSIR would also demonstrate appropriate technologies, provide training and disseminate technological solutions from CSIR as well as non-CSIR (if required) organizations for the benefit of the population in the area.

It was decided that one Tech-Vil should be set up in Madhya Pradesh by CSIR-AMPRI in collaboration with Madhya Pradesh Council of Science & Technology (MPCST).

In this context CSIR-AMPRI and MPCST carried out surveys and field visits to select a suitable village for the implementation of the project. Tumda Kheda village, located in Raisen district of M.P. has been selected for the establishment of the nodal center (Gram Vigyan Kutir) to provide benefits of the program to about 40,000 population residing in the village and its vicinity.

Technologies in some broadly selected sectors for implementation are listed below:

Agriculture and Forestry	*Horticulture, Floriculture, Medicinal and Aromatic Plants*
Food	*Post Harvesting, Agro and Food Processing*
Housing	*Low Cost Alternative Building Materials*
Environment & Sanitation	*Environmental Management and Sanitation*
Water	*Management of Potable and Grey Water*
Energy	*Energy Efficient Devices and Renewable Energy*
Waste to Wealth	*Utilization of Industrial Wastes for Value Added Materials*

Lightweight Sheet Metal Forming through Electro-Hydraulic Forming Process

Electro-hydraulic forming (EHF) is a sheet metal forming technique which uses pulsed power. A capacitor bank delivers a pulse of high current across two electrodes, which are positioned at a short distance from each other in a submerged fluid and are connected with thin Cu wires (Figure 1). A shock wave is generated in the fluid medium due to fusion of wire because of a high pulse current. This wave deforms the sheet into desired shape as per the die. This technique is pursued as renewed interest across R&D community throughout the world. One of the most important and characteristics of this process is high strain rate deformation which enables it to solve problems like springback, wrinkling and formability associated with lightweight material like Al and Mg alloys. Our activities mainly focus at assessing the formability of Al alloys by EHF process through forming limit diagram (FLD). The behavior of EHF process is related to various factors associated with it. Some of them include stand-off distance, electrode gap, medium, energy, wire diameter etc. The effects of these parameters are assessed through limiting dome height (LDH). Figure 1 shows EHF components and sectional view of the die used. Figure 2 shows the samples obtained through EHF process for FLD and LDH studies. Circle grid analysis technique is used to analyze strain in major and minor directions. The assessment indicates higher formability of Al alloys as compared to the conventional process. There is no deformation in pole region during conventional FLD test and necking/ failure is takes place in the region adjacent to the pole. But in EHF there is no such problem and necking/ failure is taking place in the central region i.e pole of the sample. The work is being further pursued to carry out the study in depth. The future plan also includes FE simulation of the EHF process.

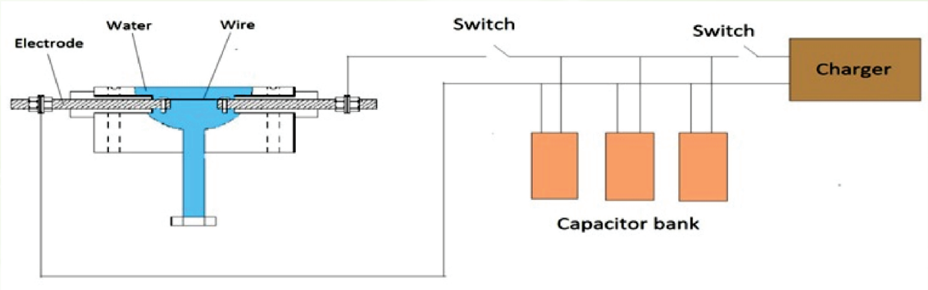


Fig 1. Electro-hydraulic forming set up

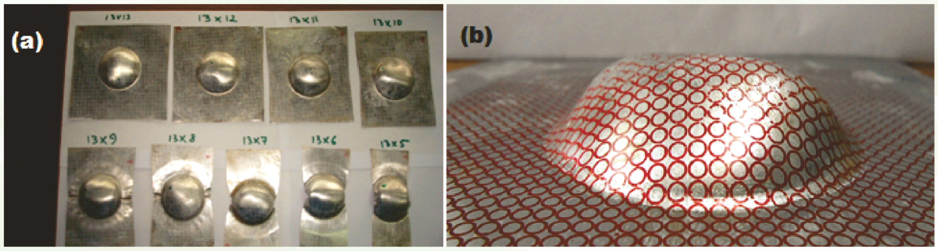


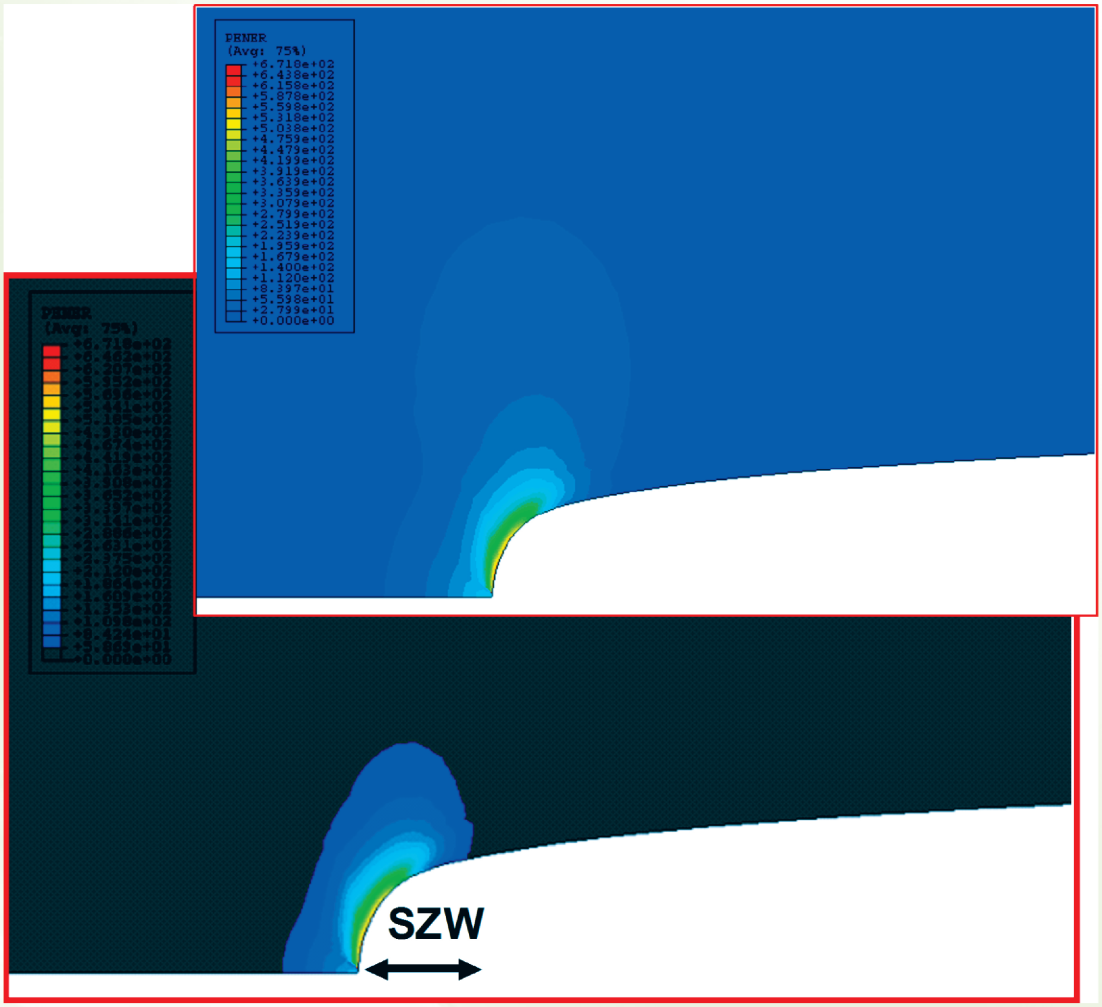
Fig. 2 Samples generated through EHF process for (a) FLD and (b) LDH studies of Al alloys.

Development of Fabricated Hydro-Generator Shaft

Hydro-generator shafts used in hydel power plants are manufactured by machining and drilling a desired size of a hole in heavy steel forging (up to 100 Tons) imported in the shape of a cylinder. The procurement of such a heavy forged material is difficult and its import is very expensive. CSIR-AMPRI Bhopal has developed a hydro-generator shaft on sponsorship from BHEL Bhopal, which is fabricated by rolling, welding and suitable post-heat treatments from a thick section of a plate with properties similar to those of forged imported material. As per BHEL, the cost of the forged material to manufacture the hydro-generator shaft is Rs.350/- per kg whereas that of the fabricated shaft is ~Rs.70/- per Kg. Accordingly, in addition to import substitution, the development of the welded hydro-generator shaft has led to material cost saving to the tune of 80%.

Numerical Prediction of Ductile Material's Stretch Zone Width, Initiation Fracture Toughness and Fracture Behaviour

Industries are increasingly demanding highly tough ductile materials to optimize the component dimensions without reducing the safety margins. Thus, it becomes indispensable that the nonlinear properties of the used materials be known and modeled precisely. Material crack initiation behaviour governs the elastic-plastic initiation fracture toughness (J). The crack initiation fracture toughness (J_i) based on critical stretch zone width (SZWc), called J_{SZW}, has received much attention. The problem in SZWc experimental evaluation lies in identifying the size of the stretch zone on a blunted crack front, as this requires a high degree of precision and expertise in measuring the SZW. A new energy based numerical methodology has been proposed to predict SZW, critical SZW and initiation fracture toughness (*J*szw) using tensile test data. In the conventional method of SZW numerical determination, semi-circular blunting shape is assumed whereas in the proposed method no such assumption is made. The proposed SZW method also defines the critical load line displacement for the determination of critical SZW and the initiation fracture toughness. In the recent numerical results, the dependency of SZWc on the fracture specimen thickness has been numerically predicted. Thus, to obtain geometry independent SZWc based evaluation of initiation fracture toughness (J_{SZW}) there was a need to understand the variation of SZWc with a geometry which may include fracture specimen thickness, initial crack size (a/W), fracture specimen a geometry and the type of loading. Using the energy based methodology; the variation of SZWc is predicted in standard and nonstandard fracture specimens. In fracture specimens, the initial crack size, thickness and the geometry of fracture specimens are varied. Three dimensional FEM models are used to predict the variation of SZWc value due to the change in fracture specimens dimensions and loading conditions. The present study showed that fracture specimen thickness and a/W ratio greater than the specified size is to be used for the numerical prediction of valid SZWc and initiation fracture toughness. It is also found that the proposed numerical method of SZW evaluation predicted the same magnitude of SZWc in the standard fracture specimens. The numerically predicted SZWc value in single edge cracked plate under tensile loading is lower than its value predicted in standard fracture specimen geometries (CT, TPB and Disk CT). The numerically predicted valid SZWc finally leads to J_{SZW} that matches well with experimental values. Using true-stress strain parameter of the material, a new minimum thickness criterion for fracture geometries has also been proposed to predict valid SZW, *J*szw quantities and to get geometry (thickness) independent fracture toughness value of ductile materials.



Energy based numerical methodology for SZW assessment

Hyper Branched Aluminosilica (HAS) and Mesoporous Silica Material

Mesoporous silica materials have been synthesized by the extraction of pyrophylite from silica mineral and fly ash by different experimental routes. Alongwith above materials, standard mesoporous silica MCM 41 has also been synthesized by using silicon dioxide precursor material such as TEOS. Optimization of the process is based on characterization results and fabrication of experimental set up for CO_2 adsorption studies. Characterization of the synthesized adsorbent samples has been carried out by various characterization techniques like XRD, FESEM, BET. These adsorbents were subjected to CO_2 adsorption at different gas flow rates and durations. Hyper branching or amine modification of prepared samples by ethanolamines such as MEA, DEA, MDEA, and PEI etc., and their characterization results are being studied. CO_2 capture experimentation with developed amine enriched mesoporous silica adsorbents is under study.

The project funded by M.P. Council of Science and Technology is aimed at the utilization of low-cost minerals of Madhya Pradesh for the development of hyper branched aluminosilica (HAS) and mesoporous silica material to sequester the effects of greenhouse gases.

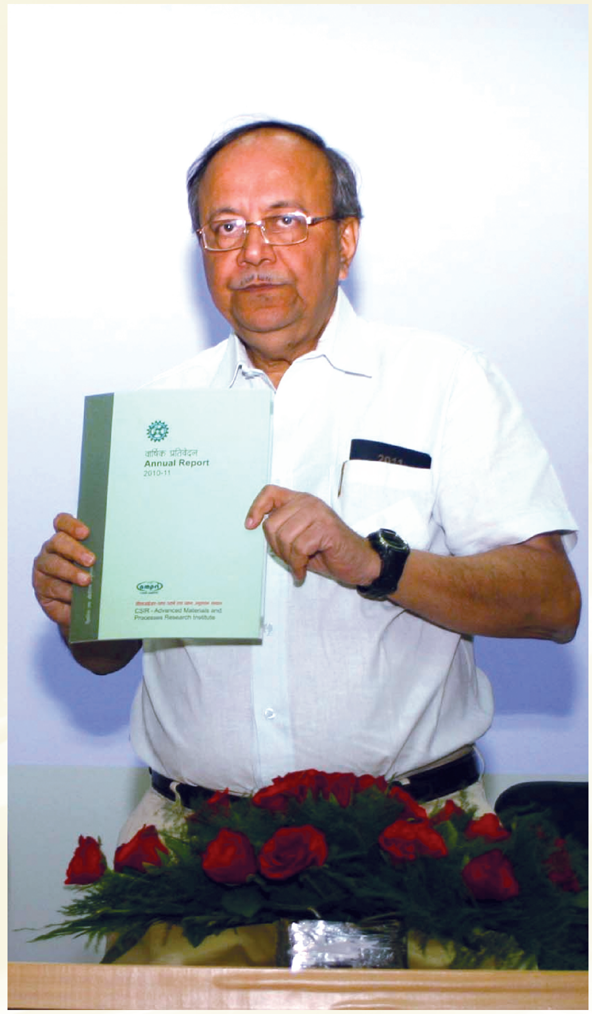
MAJOR EVENTS

Visit of the Director General, CSIR

Prof. Samir K. Brahmachari, Director General, Council of Scientific and Industrial Research (CSIR) visited CSIR – AMPRI on June 03, 2011. Prof. Brahmachari inauguratd the recently completed auditorium of CSIR – AMPRI and addressed the staff on this occasion. He also inaugurated the FESEM facility of the laboratory. Prof. Brahamachari visited the R&D exhibition of AMPRI and interacted with Scientists and Research Fellows of the Institute. In the afternoon, Heads of the Divisions presented the progress of the Institute.

DG, CSIR Visiting the Display on R&D Activities

DG, CSIR Inaugurating the FESEM Facility



DG, CSIR Releasing the Progress Report

Technology Day

2011

The Technology Day was celebrated on May 11, 2011 to commemorate the momentus accomplishments of Science and Technology. The day is celebrated every year to commemorate the spurt of technologies starting with the launching of HANSA aircaft by CSIR, the series of atomic blasts at Pokharan by Atomic Energy Commission and the firing of the Trishul missile by DRDO on May 11, 1998.

Dr. Anil K. Gupta, Director, AMPRI opened the day's proceedings with the above history. He introduced the Chief Guest of the function, Prof. Anil K. Gupta, Indian Institute of Management, Ahemedabad and Executive Vice Chair, National Innovation Foundation. He said that if R&D laboratories are doing applied research, it should be directed towards product development and the user agencies should be involved in the entire process to enhance the applicability of the product. He said that the technology should be developed, refined and made economically viable for a realistic technological development. Time management also plays an important role in technological development, he said.

The Chief Guest of the Programme, Prof. Anil. K. Gupta delivered a lecture on "Extremely Affordable and Sustainable Materials and Processes for Empathetic Innovations – MLM Model at work", He said that the user should have the autonomy and freedom to decide the specifications for the technology and we need to think along the way market is moving. He discussed in detail the triggers and facilitators in developing a viable technology and said that innovators, investors and enterprises should join hands for better results.

He later released the Annual Report, 2009-10, and the Half Yearly Newsletter of the Institite, Agrasar. Dr. Navin Chandra, Chief Scientist, AMPRI proposed the vote of thanks. An exhibition on the R&D achievements of AMPRI was on display on the occasion. The guest also planted some saplings in AMPRI premises.

2012

Technology Day was celebrated on May 11, 2012 to commemorate the momentus accomplishments of Science and Technology. Dr. Navin Chandra, Chief Scientist welcomed the guests and said that it is

Prof. Anil K. Gupta Planting a Sapling at AMPRI

Prof. Anil K. Gupta Releasing Agrasar

an occasion to dedicate our efforts for the development of technologies and any technology developed, if not reached to the society or industry, is not useful. Dr. Navin Chand, Chief Scientist introduced the speakers. First of the invited lecture was presented by Shri R.K. Shrivastava, Head, R&D, HEG Limited, Mandideep on " Recent Advances in Carbon Technology". This was followed by the lecture by Shri Uttam Ganguli, Managing Director, Bend and Joints Private Limited, Bhopal on "Lean Manufacturing". Shri P.D. Ekbote, Chief Scientist proposed the vote of thanks.

CSIR Foundation Day

2011

CSIR-AMPRI celebrated 69th CSIR Foundation Day on September 26, 2011 at the AMPRI. Dr. Sukul Lomash, General Manager, (Incharge), CEPD, Bharat Heavy Electriclas Limited, New Delhi was the Chief Guest and Dr. Navin Chandra, Chief Scientist, AMPRI presided over the function. In his address Dr. Lomash spoke about the structure of BHEL and its requirements in terms of R&D inputs. While appreciating the intellectual wealth of CSIR, he said that it was time when CSIR could collaborate with BHEL. He said that AMPRI had done many projects with BHEL and there could be more collaborations. He exhorted AMPRI scientists to come forward and participate in the mission of growth. Dr. Navin Chand, Chief Sientist welcomed the guests and Dr. Amol Kumar Jha, Chief Sicnetist introduced the Chief Guest. Dr. Navin Chandra, Chief Scientist in his address highlighed the background of the establishment of CSIR and continuous change of approach. He said that CSIR has been serving the society for it's needs. Sh. Ram Sarup, Controller of Administration proposed the vote of thanks. The Chief Guest presented the recognition and awards. Mementoes were given to the staff for completing 25 years of service in CSIR and to the staff retired on superannuation or taken voluntary retirement. The Chief Guest also presented the studentship and lumpsum cash awards to the children of staff who had secured admission in 2011 in Engineering, Management and Medical streams in prescribed institutions and for securing outstanding marks in science subjects. The programme was conducted by Dr. Manisha Dubey.

In the afternoon, an Open Day Programme was organized for the students, enterpreneurs and general public to help them in getting acqainted with the activities of CSIR-AMPRI and CSIR. In this session, presentations were made by Dr.O.P. Modi, Chief Scientist, Dr. B.K. Prasad, Sr. Prinicipal Scientist and Dr. M.J. Nandan, Sr. Scientist, CSIR-AMPRI. A film on the activities of CSIR was also shown in this session. About 200 Engineering students interacted with the scientists.

Chief Guest Dr. Sukul Lomash Speaking on the Occasion of CSIR Foundation Day

A View of the Audience

2012

AMPRI, Bhopal celebrated 70th CSIR Foundation Day on September 25, 2012 at the AMPRI. Shri Ram Naresh Yadav, H.E. The Governor of Madhya Pradesh presided over the function and Shri S.S. Gupta, Executive Director, BHEL, Bhopal was the Guest of Honour. In his address, Shri Ram Naresh Yadav said that CSIR is like a knowledge keeper and it will fulfil the requirements of the masses in the coming times. It is expected to meet the targets through innovations. He mentioned that the scientists should remain aware of the problems around them. They should also disseminate the results of their research to the masses. He said that our scientists should also cater to the needs of the rural people as our economy is primarily based on agriculture.

His Excellency, The Governor of Madhya Pradesh Shri Ram Naresh Yadav addressing CSIR@70 function of AMPRI

A view of the Audience

Shri S.S. Gupta, ED, BHEL, Bhopal spoke of CSIR and said that it is an unique organization with linkages with industries. It is a truly global R&D organization, he said. He mentioned that collaborations with BHEL and AMPRI will get stronger in future. Dr. Navin Chand, Chief Scientist welcomed the guests and highlighted the expertise available at AMPRI. Shri. P.D. Ekbote, Chief Scientist in his address spoke about CSIR Foundation Day and underlined the activities of CSIR labs. Dr. Amol Kumar Jha, Chief Scientist proposed the vote of thanks. The Governor also presented recognitions and awards. Mementoes were given to the staff for completing 25 years of service in CSIR and to the staff retired on superannuaion. In the afternoon, an Open Day Programme was organized for students to help them in getting acquainted with the activities of AMPRI and CSIR. In this session presentations were made by Dr. O.P. Modi, Chief Scientist and Shri Gaurav Gupta, Scientist, AMPRI. A film on the activities of CSIR was shown in this session. About 200 Engineering students interacted with the scientists.

CSIR Programme on Youth for Leadership in Science (CPYLS)

The CSIR Programme on Youth for Leadership in Science was organised at the Institute during December 28-29, 2011. The programme was inaugurated at AMPRI Auditorium on December 28, 2011. Smt. Nirmala Buch, Ex- Chief Secretary, Govt of M.P. was the Chief Guest and Sh. M.K. Roy, Chairman, M.P. Board of Secondary Education and Dr. Rakesh Dube, Director, Disaster Management Institute, Bhopal were the Guests of Honour at the inaugural function. Dr. R.K. Rawlley, Principal Scientist and Coordinator, CPYLS spoke about the CPYLS and Dr. Navin Chand, Chief Scientist, AMPRI briefed on the activities of AMPRI.

The inaugural function was followed by presentations by Dr. S. Mukherjee, Asst. Prof., IISER, Dr. O.P. Modi, Dr. A.K. Jha and Dr. R.K. Rawlley, Scientists of AMPRI. Later the students were taken to different labs of the Institute. The day ended with the visit of the students to the Regional Science Centre, Bhopal where they were taken to the 3D Taramandal shows and science galleries.

On the second day, the students were taken to IISER, Bhopal. They were explained about various equipment and the experiments going on and various avenues of science education and career opportunities in science. After the visit, a lecture on “Science and Life, Truths and Myths” by Sh. Rajesh Gupta, IPS was organized at AMPRI. Later a film on global warming was shown to the students. It was followed by a feedback session by the students and parents. Sh. Alok Srivastava, Principal Secretary, Science and Technology and PHED was the Chief Guest at the valedictory function, where the students were given away certificates.

MoU between CSIR-AMPRI, Bhopal and MPCST, Bhopal

With the objective to establish a rural Tech-Vil centre at Tumda Kheda village, Barkheda Setu Panchayat, Obedullahganj Block, Raisen district, M.P., which will continuously cater to the technological needs of the people through technology demonstrations, exhibitions, training and implementation in its vicinity with a view to improve the economic condition and enhance the quality of life, Memorandum of Understanding was signed between CSIR-AMPRI, Bhopal and MPCST, Bhopal on June 7, 2012 at AMPRI Auditorium. The MOU signing function was attended by a large number of officials of CSIR-AMPRI, Bhopal and MPCST, Bhopal. Prof. B K Mishra, Director, CSIR-AMPRI signed the MOU from AMPRI side and Prof. P.K. Verma, Director General, M P Council of Science and technology, Bhopal from MPCST side. Other dignitaries present on the dias were Dr. Navin Chandra, Chief Scientist ,AMPRI, Sh Ram Sarup, COA, AMPRI, Dr. J P Shukla, Principal Scientist, AMPRI, Sh Ajit Shrivastava, Executive Director, MPCST and Dr Praveen Dighra, Sr. Scientist, MPCST, Bhopal.

Prof. B.K. Mishra and Prof. P.K. Verma after signing the MoU

CSIR-AMPRI Personnel Participated in MSME Meet Organised by MPLUS, Bhopal

CSIR-AMPRI 8th CII-EXIM Bank Conclave on Indo-Africa S&T Cooperation and Project partnership at New Delhi

CSIR-AMPRI Participated in Indo-Africa S&T Ministers Conference & Expo at New Delhi

Prof B.K. Mishra, Director CSIR- AMPRI receives document from Shri Raghunandan Sharma, Member Rajya Sabha on Rajbhasha implementation

Shri Raghunandan Sharma, Member Rajya Sabha at the exhibition of CSIR-AMPRI on the occasion of Parliamentary Committee Meeting on Feb 6, 2013

39th Research Council Meeting held on 27th March 2012 at GSIR-AMPRI, Bhopal

GENERAL INFORMATION

Research Council

April 1, 2010 – March 31, 2013

Dr. G. Sundararajan Director International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI) Balapur P.O., Hyderabad-500005(AP)	**Chairman**
Dr. G. Malakondaiah Director & Distinguished Scientist Defence Metallurgical Research Laboratory (DMRL) Kanchanbagh P.O., Hyderabad– 500058	**External Member**
Dr. T. Jayakumar Group Director, Materials & Metallurgy Indira Gandhi Centre for Atomic Research Kalpakkam-603102	**External Member**
Dr. Arun Jaura Vice President, Technology Eaton India Engineering Centre 145, off. Pune Mumbai Road, Pimpri Pune – 411 018	**External Member**
Dr. Arun Kumar Group Lab Manager Light Materials General Motors R & D, Bengaluru	**External Member**
Prof. B.S. Murty Dept. of Metallurgical & Materials Engineering Indian Institute of Technology Madras Chennai-600036	**External Member**
Prof. Umesh Waghmare Theoretical Sciences Jawaharlal Nehru Centre for Advanced Scientific Research Jakkur P.O., Bengaluru-560064	**External Member**
Dr. P.K.Verma Director General M.P. Council of Science & Technology Vigyan Bhawan, Science Hills, MANIT Campus, Nehru Nagar, Bhopal -462003	**Agency Representative**
Dr. Nagesh R. Iyer Director Structural Engineering Research Centre, CSIR Campus TTTI Taramani, Chennai- 600113	**DG Nominee**

Prof. Gautam Biswas Director Central Mechanical Engineering Research Institute M.G. Avenue, Durgapur-713209	**Member-Cluster Director**
Prof. B. K. Mishra Director (Additional charge) Advanced Materials and Processes Research Institute Hoshangabad Road, Near Habibganj Naka Bhopal-462064	**Director**
Dr. Sudeep Kumar Planning & Performance Division (PPD) Council of Scientific and Industrial Research Anusandhan Bhawan, 2, Rafi Marg, New Delhi-110001	**Permanent Invitee**
Sh. P. D. Ekbote Head, Planning & Performance Division (PPD) Advanced Materials and Processes Research Institute Hoshangabad Road, Near Habibganj Naka Bhopal-462026	**Secretary**

38th and 39th RC Meetings were held on 20/06/2011 and 27/03/2012 respectively.

Management Council

January 1, 2010 – December 31, 2011

Director, AMPRI, Bhopal	Chairman
Dr. S. Gangopadhyay, Director, CRRI, New Delhi	Member
Dr. Navin Chandra, Chief Scientist	Member
Sh. P. D. Ekbote, Chief Scientist and Head PME	Member
Dr. S. Das, Chief Scientist	Member
Dr. P. Asokan, Principal Scientist	Member
Dr. (Ms.) Deepti Mishra, Senior Scientist	Member
Dr. (Mrs.) Prabha Padmakaran, Sr. Tech. Officer	Member
CoFA/F&AO	Member
Sr. CoA/CoA/AO	Member Secretary

January 1, 2012 – December 31, 2013

Director, AMPRI	Chairman
Dr. O. P. Modi, Chief Scientist	Member
Shri A. K. Singh, Principal Scientist	Member
Dr. R. Ram, Principal Scientist	Member
Dr. Sanjay Panthi, Scientist	Member
Dr. N. Saha, Sr. Technical Officer	Member
Prof. Indranil Manna, Director, CGCRI, Kolkata	Member
Sh. P.D. Ekbote, Chief Scientist and Head PPD	Member
CoFA/F&AO	Member
CoA/AO	Member Secretary

Indian Patents in Force

S. No.	Title of the Patent	Date of Grant	Patent No.
1	A non toxic composition useful for cleaning/ descaling of apertures/pipes and a process for cleaning/ descaling of apertures/ pipes using the said composition	20/01/2006	193953
2	An acid and corrosion resistant coating composition	17/09/2004	248579
3	A fly ash based composition useful for making wood substitute and a process for the preparation thereof	07/03/2003	222013
4	A novel process for casting of poly methyl methacrylate based components	29/11/2001	220685
5	A process for the preparation of fly ash filled thermoplastic blend	27/04/1998	215752
6	A composition for making mineral wool reinforced polymer composite and a process for making mineral wool reinforced polymer composite board	09/11/1998	215257
7	A process for melt blending of incompatible non interacting polymers into homogenous mixture	15/11/1996	195804
8	A composition of red mud thermoplastic composite useful for environment friendly domestic and industrial applications	13/05/1997	194596
9	A process for the preparation of improved surface coating from bhilawanut shell liquid useful for the protection of bamboo surfaces	13/08/1998	215739
10	A process for the preparation of styrene based coating from bhilawanut shell liquid useful for the protection of bamboo surfaces	11/09/1998	215096
11	An improved process for making value added products such as ceramic tiles	12/09/1997	194600
12	An improved process for the preparation of advanced ceramic materials based on substantially alkali free amorphous silicon precursors	16/09/1999	242316
13	A process of making thermal conducting metallic multistage useful for the manufacture of industrial components.	13/02/1998	232126
14	A new composition of lignocellulosic fibre, fiber reinforced polymer waste and polymer for MEBA hybrid composite and process thereof	29/11/2001	227106
15	An improved process for the preparation of metal matrix composites	13/05/1997	196946

Foreign Patents in Force

S. No.	Title of the Patent	Date of Grant	Patent No.	Country
1.	A low temperature process for making alkali free high surface area, amorphous, silicon precursor and its application making advanced ceramic materials such as silicon carbide, mullite	08/03/2007	19952337	Germany
2.	A novel process for making radiopac materials	28/4/2009	7524452	USA

Research Publications
2011

SCI Research Publications

S. No.	Name of the Authors	Title of the Papers
1	**Ankita Shukla, S.K. Sanghi, V. Sorna Gowri, V.K. Baderia, Sushma Lamba, D.K. Singh**	Determination of biological amines in lake water by miceller electrokinetic chromatography with fluorescence detection after derivatization with fluorescamine, Journal of Analytical chemistry, 66 (2011), 296 - 300
2	**A.K. Majumdar, J.P. Barnwal**	Processing of coal fines in a water-only cyclone, Fuel, 90(2011), 834–837.
3	**Aruna Patel, S. Das, B.K. Prasad**	Compressive deformation behaviour of Al alloy (2014)-10wt.% SiCp composite: Effects of strain rate and temperature, Materials Science and Engineering, 530A(2011), 225–232.
4	**B. K. Prasad**	Sliding wear behaviour of zinc-based alloy vis-à-vis gray cast iron as influenced by applied load and sliding speed, Industrial Lubrication and Tribology, 63(2011), 158–170.
5	**B.K. Prasad**	Sliding wear response of a gray cast iron: Effects of some experimental parameters, Tribology International, 44(2011), 660–667.
6	**B.K. Prasad, S. Rathod, M.S. Yadav, O.P. Modi**	Sliding wear behaviour of cast iron: influence of MoS_2 and graphite addition to the oil lubricant, Journal of Materials Engineering and Performance, 20(2011), 445-455.

7	**B.K. Prasad, S.P. Narayan, O.P. Modi, N. Ramakrishnan, A. M. Kumar, A.K. Sachdev**	Microstructure and micro-mechanism maps to optimize useful deformation processing conditions in magnesium alloy, Materials Science and Technology, 27(2011), 1639–1647.
8	**D. K. Singh, S.K. Sanghi, V. Sorna Gowri, Navin Chandra**	Determination of aliphatic amines by gas chromatography after in-syringe derivatization with pentafluorobenzoyl chloride, Journal of Chromatography A, 1218(2011), 5683–5687.
9	**D.P. Mondal, Nidhi Jha, A. Badkul, S. Das, M.S. Yadav, P. Jain**	Effect of calcium addition on the microstructure and compressive deformation behavior of 7178 aluminum alloy, Materials & Design, 32(2011), 2803–2812.
10	**Meraj Ahmed, S.K. Panthi, N. Ramakrishnan, A.K. Jha, A.H. Yegneswaran, R. Dasgupta, Siraj Ahmed**	An alternative flat coil design for electromagnetic forming using FEM, Transactions of the Non Ferrous Metals Society of China, 21(2011), 618–625.
11	**M. Sharma, G.K. Gupta, O.P. Modi, B.K. Prasad, Anil K. Gupta**	Titanium foam through powder metallurgy route using acicular urea particles as space holder, Materials Letters, 65(2011), 3199–3201.
12	**Md. Akram Khan, S. Guru, P. Prabha, D. Mishra, M. Mudgal, Savita Dhakad**	Characterisation studies and impact of chemical treatment on mechanical properties of sisal fibre, Composite Interfaces, 18 (2011), 527–541.
13	**N. Chandra, M. Sharma, R.K. Upadhyay, S. S. Amritphale**	Synthesis of nano-structured 3C-Sic by carbothermal reduction of silicon bearing gel and carbon soot, Materials Letters, 65(2011), 2161–2164.
14	**N. Chandra, S.S. Amritphale, Deepti Pal**	Manganese recovery from secondary resources: a green process for carbothermal reduction and leaching of manganese bearing hazardous waste, Journal of Hazardous Materials, 186 (2011), 293–299.
15	**Nidhi Jha, A. Badkul, D.P. Mondal, S. Das, M. Singh**	Sliding wear behavior of aluminum syntactic foam: a comparison with Al-10 wt% SiC composites, Tribology International, 44(2011), 220–231.
16	**R.N. Rao, S. Das**	Effect of applied pressure on the tribology behaviour of SiCp reinforced AA2024 alloy, Tribology International, 44(2011), 454–462.

17	**R.N. Rao, S. Das**	Effect of sliding distance on the wear and friction behaviour of as-cast and heat treated Al-SiCp composites, Materials & Design, 32(2011), 3051–3058.
18	**S.A.R. Hashmi, Ajay Naik, Navin Chand, Janu Sharma, Prabhat Sharma**	Development of environment friendly hybrid layered sisal–glass–epoxy composites, Composite Interfaces, 18(2011), 671–683.
19	**Sanjeev Saxena**	Assessing the accuracy of fatigue life in surface cracked straight pipes, Fatigue Fracture of Engg. Materials and Structures, 34(2011), 1003–1011.
20	**A. Badkul, Nidhi Jha, D.P. Mondal, S. Das, M.S. Yadav**	Age hardening behaviour of 2014 Al alloy-SiC composites: Effect of porosity and strontium addition, Indian Journal of Engineering & Materials Science, 18(2011), 79–85.
21	**D. Singh, D.P. Mondal , K.P. Saha**	Development of mathematical model for prediction of abrasive wear behaviour in agricultural grade medium carbon steel, Indian Journal of Engineering and Materials Science, 18(2011), 125–136.
22	**D.M. Dewaikar, H.S. Chore, M.D. Goel, P.R. Mutgi**	Lateral resistance of long piles in cohesive soils using p-y curves, Journal of Structural Engineering, 38(2011), 222–227.
23	**M.D. Goel, V.A. Matsagar, A.K. Gupta**	Dynamic response of stiffened plates under air blast, International Journal of Protective Structures, 2(2011), 139–155.
24	**M. Saxena, P. Asokan, S. Murali, B. Yadav, S. Sangeeta**	Pilot-scale demonstration study of the impact of fly ash on soil fertility and crop yield, Land Contamination & Reclamation, 18 (2011), 345–353.
25	**M. Saxena, P. Mehrotra, P. Asokan**	Innovative building materials from natural fibre and industrial waste, Land Contamination & Reclamation, 18 (2011), 355-362.
26	**R. Khedle, D.P. Mondal, S.N. Verma, S. Panthi**	FEM modeling of compressive deformation behaviour of aluminum-cenosphere syntactic foam, International Journal of Applied Engineering Research, 6(2011), 1235–1246.

27	**S. Murali, R. Shrivastava, M. Saxena**	Green house gas emissions from open field burning of agricultural residues in India, Journal of Environmental Science & Engineering, 52(4)(2011), 272–284.
28	**S. Akinchan, A. Saxena, J.P. Shukla**	Open source software technology in advancement of geomatics education, International Journal of Geomatics and Geosciences, 2 (2011), 42–48.
29	**R.K. Bhushun, S. Kumar, S. Das**	GA approach for optimization of surface roughness parameters in machining of Al alloy SiC particle composites, Journal of Materials Engineering and Performance, 4(2011), 1–11.
30	**S. Soni, J.P. Pandey**	Erosion behaviour of steam turbine blades of glass epoxy, International Journal of Advanced Engineering and Technology, 2(2011), 110–117.
31	**R. Khedle, D.P. Mondal, S.N. Verma, S. Panthi**	FEM modeling of the interface strength and its effect on the deformation behaviour of aluminum cenosphere syntactic foam, Computers, Materials and Continua, 27(3)(2011), 220–232.
32	**R. Paul, M. Prasad, N.K. Sah**	Anticancer biology of Azadirachta indica L (Neem) : a mini review, Cancer Biology and Therapy, 12(6)(2011), 467–476.
33	**S.K. Panthi, N. Ramakrishnan**	Semi analytical modeling of springback in arc bending and the effect of forming load, Transactions of Nonferrous Metals Society of China, 21(10)(2011), 2276–2284.
34	**A. Anshul, S.S. Amritphale, Rashmi Yadav, Sarabjeet Kaur, Renu Hada**	Wide range magnetoresistance through grain size variation in Ag doped lanthanum manganite, Materials Research Innovations, 15(4)(2011), 274–278.
35	**A. Anshul, S.S. Amritphale, Sarabjeet Kaur, Renu Hada**	Nanomaterials synthesis and role of granular disorders on electrical behaviour of lanthanum manganites, Journal of Materials Science Technology, 27(8)(2011), 691-695.

Non SCI Research Publications

S. No.	Name of Authors	Title of the Papers
1	**Md. Akram Khan, Rajnish Shrivastava**	Physico-chemical characterization of zinc industry waste cake, Journal of Search and Research, 3(2)(2011), 9–12.
2	**P. Asokan, M. Saxena, S.R. Asolekar**	Waste to wealth - cross sector waste recycling opportunity and challenges, Canadian Journal on Environment, Construction and Civil Engineering, 2(2011), 14–23.
3	**Rupa Das gupta**	All about hydroforming, Metal World, 10(12)(2011), 31–33.
4	**Rupa Dasgupta, S. Das, A.K. Jha**	Application potential for new aluminium based materials industrial inputs, Metal World, 10(11) (2011), 22–26.
5	**S. Ventura, N. Carneiro, A.P. Souto, S. Gowri**	Acabamento de textels multifuncionais com nanocompososítos polimericos, Artigo Tecnico, Q8(2011), 8–13.
6	**S.K. Sharma, N.K. Seth, S. Tignath, J.P. Shukla**	Morphological study of a watershed using remote sensing and GIS approach, J.N.K.V.V. Research Journal, 45(2)(2011), 54–58.
7	**S.K. Sharma, N.K. Seth, S. Tignath, J.P. Shukla**	Land use-Land cover mapping of Eusuru river watershed using remote sensing and GIS technique, J.N.K.V.V. Research Journal, 45(2)(2011), 202–205

2012

SCI Research Publications

S. No.	Name of the Authors	Title of the Papers
1	**A. Anshul, S.S. Amritphale, A.K. Gupta, R. Yadav, N. Chandra**	Wide range collosal magnetoresistance in LaO.7AO.3MnO_3(A=Sr,Ag) thin films, International Journal of Applied Ceramic Technology, 9(2012), 214–220.
2	**D. Singh, D.P. Mondal , V.K. Sethi**	Effect of peening intensity and applied load on low stress abrasive wear response of agricultural grade SAE-6150 steel, Journal of Agricultural Engineering Research, 49(2)(2012), 1–7.

3	**D. Singh, D. P. Mondal, S. Rathod , S.V. Prasad**	Synergic effect of heat-treatment and peening intensity on low stress abrasive wear behaviour of high strength low alloy agricultural grade medium carbon steel-, Agricultural Mechanisation in Asia, Africa and Latin America, 43(2)(2012), 74.
4	**D.P. Mondal, Nidhi Jha, A. Badkul, S. Das**	Effect of Al-TiB master alloy addition on microstructure, wear and compressive deformation behaviour of aluminum alloys, Transaction of Non Ferrous Metals Society of China, 22 (2012), 1001–1011.
5	**M.D. Goel, M. Peroni, G. Solomos, D.P. Mondal, V.A. Matsagar, A.K. Gupta, M. Larcher, S. Marburg**	Dynamic compression behaviour of cenosphere aluminum alloy syntactic foam, Materials & Design, 42(2012) 418–423.
6	**M.D. Goel, V.A. Matsagar, A.K. Gupta , S. Marburg**	An abridged review of blast wave parameters, Defence Science Journal, 62(2012), 300–306.
7	**P. Asokan, M. Firdous, W. Sonal**	Properties and potential of bio-fibres, bio-binders and bio-composites, Review of Advanced Materials Science, 30(2012), 254–261.
8	**R.K. Upadhyay, M. Sharma, D.K. Singh, S.S. Amritphale , N. Chandra**	Photo degradation of synthetic dyes using calcium sulphide nanoparticles synthesized in the presence of different capping agents, Separation and Purification Technology, 88(2012), 39–45.
9	**Raghvendra Khedle, D.P. Mondal, S.N. Verma , Sanjay Panthi**	FEM modeling of the interface strength and its effect on the deformation behaviour of aluminum cenosphere syntactic foam, CMC, 723(2012) 211–229.
10	**Raghvendra Khedle, D.P. Mondal, S.N. Verma , Sanjay Panthi**	FEM modeling of compressive deformation behavior of aluminum cenosphere syntactic foam (acsf) under constrained condition, Indian Journal of Engineering and Materials Science, 19(2012), 135–143.
11	**Rupa Dasgupta, S. Das , A.K. Jha**	Sliding wear behaviour of Al- 7075 based metal matrix composites: effect of processing parameters – Key Engineering Materials, Trans. Tech. Publications, Switzerland, 504–506(2012), 556–560.
12	**S.K. Panthi, Sanjeev Saxena**	Numerical prediction of crack location in deep drawing processes using finite element simulation, CMC, 724(1)(2012), 1–13.

23	**I.B. Singh, M. Singh, S. Das, Anil K. Gupta**	A comparative corrosion study of LM31-alloy, LM-13 10SiCp composite and cast iron in NaCl solution. Indian Journal of Chemical Technology, 19(2012), 385–391.
24	**P. Shrivastava, P.K. Singh, S.K. Panthi**	Finite element simulation of hole flanging process of advanced high strength steel, International Journal of Mechanical and Production Engineering Research and Development, 3(1)(2013), 27–32.
25	**R. Dasgupta, S. Chaturvedi, A.K. Jha**	Combined effects of composite making, ageing and extrusion on property improvement in Al-7075-based alloy, International Journal of Microstructure and Materials Properties, 7(6)(2012), 475–490.
26	**R.N. Rao, S. Das, D.P. Mondal, G. Dixit**	Mechanism of material removal during tribological behaviour of aluminium matrix (Al-Zn-Mg-Cu) composites, Tribology International, 53(2012), 179–184.
27	**R.N. Rao, S. Das, D.P. Mondal, G. Dixit, S.L. Tulsai Devi**	Dry sliding wear maps for AA7010 (Al-Zn-Mg-Cu) aluminium matrix composite, Tribology International, 60 (2013), 77–82.
28	**R. S. Rana, Rajesh Purohit, S.Das**	Review on the influence of alloying elements on the microstructure and mechanical properties of aluminium alloys and aluminium, Intenational Journal of Scientific & Research Publications, 2(6)(2012).
29	**R.K. Bhushun, S. Kumar, S. Das**	Fabrication and characterization of 7075 Al alloy reinforced with SiC particulates, International Journal of Advanced Manufacturing Technology, 65(5–8)(2013), 611–624.
30	**R.K. Morchhale, S.S. Waghmare, M.D. Goel, S. Murali**	Performance evaluation of concrete I-girder of a bridge, Indian Concrete Journal, 86(2)(2012), 27–32.
31	**S. Das, B.K. Prasad,**	Al and Mg based lightweight metallic materials for automobile applications, Invertis Journal of Science and Technology, 5(2)(2012), 1–10.
32	**Md. Akram Khan, Rajnish Shrivastava**	Solidification-stabilization of zinc waste for abatement of hazardous potential, International Journal of Advanced Engineering Technology, 3(3)(2012), 29–30.

13	**V.K. Baderia, V. Sorna Gowri, S.K. Sanghi, A. Shukla, D.K. Singh**	Stable physically adsorbed coating of vinyl poly alcohol for the separation of basic proteins, Journal of Analytical Chemistry, 67 (3) (2012), 278-283
14	**V. Sorna Gowri, Lu ı ´s Almeida, Teresa Amorim, Noe´mia Carneiro, Anto´nio Pedro Souto, Maria Fa´tima Esteves**	Novel Copolymer for SiO_2 nanoparticle dispersion, Journal of Applied Polymer Science, 124(2012), 1553–1561.
15	**Sanjeev Saxena**	Numerical evaluation of geometric independent stretch zone width value for assessing value J_{szw}, Nuclear Engineering and Design, 252(2012), 68–77.
16	**Ruhi Haq, M. Saxena. S.C. Shit, P. Asokan**	N-Methyl benzyl amine thallium cyclometallic compound as a catalyst for ring opening ploymerization, Research Journal of Chemistry and Environment, 17(2)(2013), 35–41.
17	**M. Sharma, G.K. Gupta, O.P. Modi, B.K. Prasad**	P/M processed Ti foam – influence of morphology and content of space holder on microstructure and mechanical properties, Powder Metallurgy, 56(2013), 55–60.
18	**A. Rehman, S. Das, G. Dixit,**	Analysis of stir die cast Al-SiC composite brake drums based on coefficient of friction, Tribology International, 51(2012), 36–41.
19	**D. Singh, D.P. Mondal**	Heat-treatment process and peening intensity on abrasive wear response of agricultural grade boron steel in dry sand and slurry, Indian Journal of Agricultural Sciences, 82(2)(2012), 152–157.
20	**D.P. Mondal, J. Datta Mazumdar, Nidhi Jha, A. Badkul, S. Das, Aruna Patel, G.K. Gupta**	Titanium cenosphere syntactic foam made through powder metallurgy route, Materials & Design, 34(2012), 82–89
21	**D.P. Mondal, Nidhi Jha, A. Badkul. S. Das, R. Khedle**	High temperature compressive deformation behavior of aluminum syntactic foam, Materials Science and Engineering, 534A(2012), 521–529.
22	**D.P. Mondal, Nidhi Jha, B. Gull, S. Das, A. Badkul**	Micro-architecture and compressive deformation behaviour of Al alloy (LM13) – cenosphere hybrid Al foam prepared using $CaCO_3$ as foaming agent, Materials Science and Engineering, 560A(2013), 601–610.

33	**Md. Akram Khan, Rajnish Shrivastava**	Study on application potential of waste cake from secondary zinc industry, Current World Environment, 7(2012), 51-54.
34	**Amit Sharma, O.P. Modi, Gaurav K. Gupta**	Effect of fuel to oxidiser ratio on synthesis of alumina owder using solution combustion technique, aluminum nitrate and glycine combination, Advances in Applied cience Research, 3(4)(2012), 2151–2154.
35	**B.K. Prasad**	Sliding wear response of a bronze bushing: influence of applied load and test environment, Journal of Materials Engineering and Performance, 21(2012), 2155–2164.
36	**A.K. Gupta, B.K. Prasad, R.K. Pajnoo, S. Das**	Mechanical and abrasive and erosive-corrosive wear properties of eutectic Al-Si alloy: effects of T6 heat treatment parameters, Transactions of Nonferrous Metals Society of China, 22(2012), 1041–1050.
37	**A. Kaithwas, M. Prasad, A. Kulshreshtha, S. Verma**	Industrial wastes derived solid adsorbents for CO_2 capture: a mini review, Chemical Engineering Research and Design, 90(2012), 1632–1641.
38	**B.K. Prasad**	effects of some solid lubricant particles and their concentration in oil towards controlling the wear performance of a leaded-tin bronze bush, Canadian Metallurgical Quarterly, 51(2)(2012), 210–220.
39	**B. K. Prasad, S.P. Narayan, O.P. Modi, N. Ramakrishnan, A.M. Kumar, A.K. Sachdev**	Effect of cerium and aluminium on the hot-deformation behaviour of magnesium, International journal of Materials Research, 103(2012), 590–602.
40	**D.P. Mondal, Nidhi Jha, S. Das, Ansul Badkul**	Use of cenosphere for making Al-syntactic foam through stir casting technique, Indian Foundry Journal, 58(8)(2012), 31–38.
41	**D.P. Mondal, Nidhi Jha, S. Das**	Closed cell aluminum foam with hybrid porosity through stir casting technique, Indian foundry Journal, 58(11)(2012), 23–28.

42	**Shyam Birla, D.P. Mondal, Lakhan Patidar, Prabhash Jain**	Compressive deformation behaviour and characterisation of hybrid aluminum metal foam, International Journal of Advanced Materials Science, 1(3)(2012), 275–292.

Non - SCI Research Publications

S. No.	Name of the Authors	Title of the Papers
1	**M.D. Goel, T. Chakraborty, V.A. Matsagar**	Dynamic response of steel-sand composite stiffened plates under impulsive loading, Journal of Battlefield Technology, Argos Press, Australian Defence Force Academy, 15(3)(2012), 1–7.
2	**M.D. Goel, K. Laxminarayan**	Deformation and energy absorption of sliding foam filled square tubes – practice periodical in structural design and construction, Advanced Materials Research, 585(2012), 34-38.
3	**Rupa Dasgupta, Meraj Ahmed, A.K. Jha**	Electromagnetic forming and its activities at CSIR-AMPRI, Metal World, 11(2012), 85–87.
4	**Sapna Guru, Manju Singh, Prabha Padmakaran, S.S. Amritphale**	Comparative study on commercially available samples containing paracetamol as API, Research Scapes, I–II (2012).
5	**Rupa Dasgupta, A.K. Jha, S. Das**	Effect of addition of SiC particle on the dry sliding wear behaviour of extruded 2014 Al-alloy, ISRN Tribology, (2013), 1–9.
6	**Rupa Dasgupta**	Aluminium alloy based metal matrix composite: a potential material for wear resistant applications ISRN Metallurgy, (2012), 1–14.

7	**Amit Sharma, O.P. Modi, Gaurav K. Gupta**	Combustion synthesis of nano crystalline Al_20_3 powder using alumina nitrate & urea as reactant- influence of reactant composition, Advances in Applied Science, 3(6) (2012), 3819–3824.

Visits Abroad

2011

Dr. Murari Prasad visited College of Materials Science & Engineering, Harbin University of Science & Technology, P.R. China, for International Exchange and Cooperation, 16–22 July 2011.
Dr. J.P. Barnwal visited Istanbul, Turkey as a member of delegation of The Institution of Engineers (India) to attend 22nd World Mining Congress, 11–16 September 2011.
Dr. S. Das Chief Scientist visited Korea on invitation of Chanhwon National University, Changwon, Kyungnam, Korea and attended 7th International Conference on porous metals and metallic foam, 18-24 September 2011.
Dr. Sorna Gowri visited University of Minho, Portugal under the Bilateral Cooperation/Indo-Portugal Collaborative project for Training on Development and Optimization of Processes for Permanent Hydrophilic and Hydrophobic Surface Coatings with Nano Particles for Multifunctional Finishing of Textiles, 30th Nov. to 10th December 2011.

2012

Dr. O.P. Modi visited Netherlands for Overseas Equipment Training on FE-SEM with EBSD & EDS at FEI, 10-25 March 2012.
Shri Gaurav Kumar Gupta visited Netherlands for Overseas Equipment Training on FE-SEM with EBSD & EDS at FEI, 10-25 March, 2012.
Dr. S.P. Narayan visited Japan for 22nd International Workshop on Race Earth Permanent Magnets & their Applications, 2-5 September 2012.
Dr. S.A.R. Hashmi visited Turkey and delivered plenary lecture in the 3rd International Polymer Composite Symposium , Exhibition and Workshop, 08-13 November 2012.

Dr. Edward Peters visited The Netherlands and attended training/workshop on the use of earth observation tools in support of integrated water resources management, 2-7 December 2012.
Dr. Sorna Gowri visited University of Minho, Portugal to attend the meeting relating to the ongoing project" Development and optimization of process of permanent hydrophibic coating with nano particles for multifunctional finishing of textiles, 20-31 December 2012.

Awards and Recognitions

Dr. Navin Chandra **Chief Scientist**	Nomination – Member of Board of Governors of Maulana Azad National Institute of Technology, Bhopal (M.P.) from 6^{th} Feb 2012 to 15^{th} January 2015.
Dr. Navin Chand **Chief Scientist**	Delivered B.K. Chakrabarti, Memorial Lecture for the year 2012-13 organised by the Textile Engineering Board, Institution of Engineers (India), Bhopal Chapter.
Dr. S.P. Narayan **Chief Scientist**	Nomination – Member of International Advisory Committee of 22^{nd} International Workshop on Rare Earth Permanent Magnets (REMP-2012).
Dr. SAR Hashmi **Senior Principal Scientist**	MRSI Medal for his significant contributions to the field of Material Science and Engineering by Material Research Society of India.
Dr. D.P. Mondal **Senior Principal Scientist**	Best Paper Award on "Effect of peening intensity and applied load on low stress abrasive wear response of agricultural grade SAE-6150 steel", Indian Society of Agricultural Engineers, New Delhi, 28^{th} January 2013.
Dr. P. Asokan **Senior Principal Scientist**	Best Paper Award for "Synthesis of biodegradable polymer polylactide (PLA) ring opening polymerization using Tin catalyst." conferred by NITTR Bhopal, National Conference on Advances in Pharmaceutical Research and Chemistry, 24^{th} March 2012.
Shweta Taose, Prabha Padmakaran, M.A. Khan, S.S. Amritphale, Navin Chandra	Best Paper in Poster Session for "A novel ligno-silicious binder made from rice hulls useful for green cementitious materials", National Workshop on Chemistry and Environment, Bhopal, April 2012.
Md. Akram Khan, **Principal Scientist**	Member of state level Environment Award Committee, M.P. Pollution Control Board, Bhopal for the year 2011-12 and 2012-13.

Dr. J.P. Shukla, Principal Scientist	Nominated Associate Editor of International Journal of Fundamental and Applied Research, Bhopal.
Dr. J.P. Shukla, Principal Scientist	Nominated Member of Board of Studies in Earth Science, MGCGV, Chitrakoot (M.P.).
Dr. J.P. Shukla, Principal Scientist	Nominated Executive Member of Indian Society of Remote Sensing, Dehradun for 2010-12.
Sh. Ranjit Singh Solanki, Chief Scientist	Prof. (Ing.) Dr. Tech. ESSA Jozef Chabelka award for the significant Coutribution towards the welding & Fabrication Industry, awarded by Slovak University of Technology, Bratislava, 22nd May 2012.

Invited Lectures at CSIR-AMPRI

Shri Anupam Vivek, Ohio State University, New York, on "High Strain Rate Forming", 31st May 2011.
Dr. S. Gangopadhyay, Director, CSIR-CRRI, New Delhi, on "Mobility and Safety on Indian Roads", 8th June 2011.
Dr. G. Sundararajan, President, MRSI, Chairman, RC, AMPRI and Director, International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad on "Development and Commercialization of MAO Coating Technology: ARCI's Experience" 20th June 2011.
Mr. Keith Dicks and Mr. Mangesh Kulkarni, Oxford Institute, U.K., on "EBSD/EDXS and the Applications", 24th June 2011.
Dr. Suresh Bhalla, Associate Professor, IIT Delhi on "Scientific Design Methodology of Bamboo Structures", 29th June 2011.
Dr. Sudhir K. Barai, Professor, IIT, Kharagpur on "An Overview of Soft Computing Tools", 8th July 2011.
Dr. Harvinder Singh Ubhi, Oxford Instruments, U.K., on "Microstructural Characterization using SEM/EBSD", 23rd December 2011.
Dr. Prashant K Sharma, University Medical Center Groningen, The Netherlands, on "Implant and Prosthesis", 9th February 2012.

Prof. Surendra K. Saxena, Mechanical & Materials Engg, Florida International University, Miami, USA, on "Materials under Extreme Conditions", 12th March 2012.
Dr. Giovanni L A Pesce, Italy, on "Lime Based Building Materials Nanolime Carbonation and Radiocarbon Dating", 1st June 2012.
Mr. Apoorv Mahendru and Ms. Shubhada, on "Frontier Research Areas in Germany and Collaboration Opportunities", 5th December 2012.
Dr. A.K. Gwal, Professor of Physics, Barkatullah University, Bhopal, on "Plasma Density Variation in Near Earth Space: Precursor to earthquake", 14th March 2013.

राजभाषा गतिविधियाँ

हिंदी दिवस समारोह

8 सितंबर, 2011 से प्रारंभ हिंदी सप्ताह का समापन प्रगत पदार्थ तथा प्रक्रम अनुसंधान संस्थान (एम्प्री), भोपाल में हिंदी दिवस के रूप में 14 सितंबर, 2011 को हुआ। देश के शीर्षस्थ व्यंग्यकार डॉ. ज्ञान चतुर्वेदी कार्यक्रम में मुख्य अतिथि थे। हिंदी सप्ताह के दौरान संस्थान के स्टाफ सदस्यों के लिए निबंध, अनुवाद एवं श्रुतलेख, टिप्पण तथा तात्कालिक भाषण प्रतियोगिताओं का आयोजन किया गया। मुख्य कार्यक्रम के आरम्भ में एम्प्री के मुख्य वैज्ञानिक डॉ. नवीन चंद्रा ने अतिथियों का स्वागत करते हुए राजभाषा में काम करने के महत्व को रेखांकित किया। इसके उपरान्त प्रशासन नियंत्रक श्री राम सरूप ने अतिथि परिचय दिया। अपने उद्‌बोधन में कार्यक्रम के मुख्य अतिथि डॉ. ज्ञान चतुर्वेदी ने अपनी बात ख्यातिनाम गजलकार दुष्यंतकुमार के एक शेर से करते हुए कहा "मैं जिसे ओढ़ता–बिछाता हूँ, वो गजल आपको सुनाता हूँ" कि किसी भी साहित्यकार की रचना उसके जीवन से इतना ही जुड़ी होनी चाहिए और आपको अपने काम से लगातार असंतोष होना चाहिए, तभी काम का स्तर बना रह पाएगा। हिंदी रोजगार की भाषा नहीं है। भाषा को जब तक रोजगार की भाषा में नही बदला जा सकता, तब तक भाषा में समग्रता नहीं आ पायेगी, उन्होंने कहा। समाज में हिंदी की स्थिति को उन्होंने बहुत ही रोचक तरीके से अपने व्याख्यान में पिरोया।

इस अवसर पर मुख्य अतिथि ने संस्थान की राजभाषा पत्रिका सोपान का विमोचन किया। मुख्य अतिथि ने सभी प्रतियोगिताओं के विजेताओं तथा राजभाषा में शासकीय कार्य करने वाले स्टाफ को प्रोत्साहन पुरस्कार वितरित किये। डॉ. एस. ए.आर. हाशमी, वरिष्ठ वैज्ञानिक ने धन्यवाद ज्ञापन किया। कार्यक्रम का संचालन डॉ. मनीषा दुबे, हिंदी अधिकारी द्वारा किया गया।

हिन्दी सप्ताह के अवसर पर प्रतियोगिताओं का आयोजन

मुख्य अतिथि डॉ. ज्ञान चतुर्वेदी सोपान का विमोचन करते हुए

राजभाषा कार्यशालाएं

- एम्प्री में दिनांक 20.04.2011 को एक अर्द्ध–दिवसीय राजभाषा कार्यशाला का आयोजन किया गया। कार्यशाला का उद्‌घाटन एम्प्री के प्रशासन नियंत्रक श्री राम सरूप ने किया। अपने उद्‌बोधन में श्री राम सरूप ने राजभाषा कार्यशालाओं की अनिवार्यता और उपयोगिता को रेखांकित किया। कार्यशाला में संस्थान की वरिष्ठ हिन्दी अनुवादक डॉ. मनीषा दुबे ने उपस्थित स्टाफ को भारत सरकार की राजभाषा नीति से अवगत कराया। कार्यक्रम के दूसरे भाग में अनुभाग अधिकारी (वित्त एवं लेखा) श्री गिरीश चंद ने चिकित्सा भत्तों पर हिंदी में एक व्याख्यान दिया। उन्होने सी एस आई आर स्टाफ को मिलने वाले चिकित्सा भत्तों के विषय में विस्तार से विवरण दिया।

हिन्दी कार्यशाला प्रगति पर

हिन्दी कार्यशाला प्रगति पर

- एम्प्री में दिनांक 29.09.2011 को एक अर्द्ध–दिवसीय राजभाषा कार्यशाला का आयोजन किया गया। कार्यशाला का उद्‌घाटन एम्प्री के मुख्य वैज्ञानिक डॉ. नवीन चंद ने किया। अपने उद्‌बोधन में डॉ. नवीन चंद ने राजभाषा कार्यशालाओं के

महत्व पर बल दिया। कार्यशाला में बी एस एन एल, भोपाल के निदेशक (राजभाषा), डॉ. सुमन कुमार ने उपस्थित स्टाफ के सम्मुख राजभाषा अधिनियम के मुख्य बिन्दुओं को प्रस्तुत किया। कार्यक्रम में संस्थान के समस्त प्रशासनिक स्टाफ राजभाषा अधिनियम के प्रतिभागिता की।

वैज्ञनिक कार्यशाला

एम्प्री में 22 दिसम्बर, 2011 को एक दिवसीय वैज्ञानिक हिन्दी कार्यशाला का आयोजन किया गया। इसके अंतर्गत बहुत ही रोचक तथा प्रभावी रूप से हिन्दी में वैज्ञानिक शोध पत्र प्रस्तुत किए गए। कार्यक्रम के समन्वयक डॉ. एस.ए.आर. हाशमी, वरिष्ठ प्रमुख वैज्ञानिक तथा डॉ. नवीन चन्द्रा, मुख्य वैज्ञानिक कार्यक्रम में मुख्य अतिथि थे। डॉ. ओ.पी. मोदी, मुख्य वैज्ञानिक ने तकनीकी सत्र की अध्यक्षता की।

कार्यशाला का उद्घाटन करते हुए डॉ. नवीन चंद्रा ने राजभाषा अधिनियम की आवश्यकताओं तथा कार्यान्वयन को रेखांकित किया और कहा कि हमें हिन्दी में काम करने के लिए वातावरण बनाना होगा, क्योंकि वैज्ञानिकों के पास अपने अनुसंधान कार्यों को जनसामान्य तक पहुँचाने की अतिरिक्त जिम्मेदारी होती है। डॉ. शशि प्रकाश नारायण, मुख्य वैज्ञानिक ने ''3डी एवं 4डी प्रक्रम प्रतिरूपण के माध्यम से मैग्नीशियम–सेरियम के विरूपण व्यवहार का अध्ययन'', डॉ. नारायण साहा, वरिष्ठ तकनीकी अधिकारी ने ''गणितीय एवं कम्प्यूटर अनुकरण के माध्यम से परियोजना मूल्यांकन'' तथा डॉ. एस. मुरली, वरिष्ठ वैज्ञानिक ने ''सिसल (एगेव सिसलाना) की खेती एवं प्रसार'' विषयों पर हिन्दी में शोधपत्र प्रस्तुत किए।

कार्यशाला का संचालन डॉ. मनीषा दुबे, हिन्दी अधिकारी ने किया तथा धन्यवाद ज्ञापन श्री रेवाशंकर अहिरवार, प्रमुख वैज्ञानिक ने दिया।

स्टाफ को 'सुविधा' सॉफ्टवेयर पर प्रशिक्षण

24 फरवरी, 2012 को स्टाफ को 'सुविधा' सॉफ्टवेयर संबंधी प्रशिक्षण दिया गया। जो स्टाफ सदस्य परंपरागत टाइपिंग विधियों से परिचित नहीं है, उनके लिए यह सॉफ्टवेयर अत्यधिक सहायक हो सकता है। कार्यालय में हिन्दी का प्रयोग इसके माध्यम से बढ़ाया जा सकता है।

राजभाषा कार्यशाला

20 मार्च, 2012 को संस्थान में एक दिवसीय हिन्दी कार्यशाला का आयोजन किया गया। वरिष्ठ विज्ञान लेखक डॉ. डी.डी. ओझा इस कार्यशाला में मुख्य अतिथि थे। सी एस आई आर – एम्प्री के मुख्य वैज्ञानिक डॉ. नवीन चन्द्रा ने कार्यशाला का उद्घाटन किया। उन्होने कहा कि स्थानीय भाषाओं में वैज्ञानिक शोध का प्रसार अनिवार्य है, क्योंकि इसी माध्यम से आम जनों तक नए अविष्कारों का लाभ पहुँच सकता है।

डॉ. डी.डी. ओझा ने भारत सरकार की राजभाषा नीति की आवश्यकताओं पर एक प्रस्तुतीकरण दिया और कहा कि हिन्दी एक अत्यंत सम्पन्न भाषा है और इसकी शब्दावली भी अत्यंत सम्पन्न है, हिन्दी के प्रयोग को हमें बढ़ावा देना चाहिए।

प्रारंभ में हिन्दी अधिकारी डॉ. मनीषा दुबे ने अतिथि परिचय दिया।

हिंदी दिवस समारोह

दिनांक 7 सितम्बर, 2012 से प्रारंभ हिन्दी सप्ताह का समापन हिन्दी दिवस के रूप में 14 सितम्बर, 2012 को हुआ। वरिष्ठ साहित्यकार एवं संचालक, म.प्र. हिन्दी ग्रंथ अकादमी प्रो. गोविंद प्रसाद शर्मा कार्यक्रम में मुख्य अतिथि थे।

हिन्दी सप्ताह के दौरान संस्थान के स्टाफ सदस्यों के लिए निबंध, अनुवाद, श्रुतलेख, टिप्पण तथा तात्कालिक भाषण प्रतियोगिताओं का आयोजन किया गया। कार्यक्रम के आरम्भ में एम्प्री के मुख्य वैज्ञानिक डॉ. नवीन चंद ने अतिथियों का स्वागत करते हुए राजभाषा में काम करने के महत्व को रेखांकित किया। इसके उपरान्त प्रशासन नियंत्रक श्री राम सरूप ने अतिथि परिचय दिया। अपने उद्बोधन में कार्यक्रम के मुख्य अतिथि ने प्रसन्नता व्यक्त की कि वे वैज्ञानिकों के बीच हैं। उन्होने कहा कि कुल मिलाकर समूचे देश में पहचाने जाने वाली भाषा हिन्दी है अतः इसे व्यापक और विस्तृत परिप्रेक्ष्य में समझे जाने की आवश्यकता है। विज्ञान के विशेष परिप्रेक्ष्य में भाषा की बात करते हुए उन्होंने कहा कि विज्ञान हमारे यहाँ सदियों से है और उससे जुड़ी शब्दावली भी। उन्होने कहा कि आज भाषा का क्रिओलीकरण हो गया है और भाषा परिवर्तित हो गयी है।

इस अवसर पर मुख्य अतिथि ने संस्थान की राजभाषा पत्रिका सोपान का विमोचन किया। मुख्य अतिथि ने सभी प्रतियोगिताओं के विजेताओं तथा राजभाषा में शासकीय कार्य करने वाले स्टाफ को प्रोत्साहन पुरस्कार वितरित किये।

डॉ. एस.आर.हाशमी, वरिष्ठ प्रमुख वैज्ञानिक ने धन्यवाद ज्ञापन किया। कार्यक्रम का संचालन डॉ. मनीषा दुबे, हिंदी अधिकारी द्वारा किया गया।

राजभाषा कार्यशाला

संस्थान में राजभाषा के प्रयोग को और अधिक बढ़ाने के लिए दिनांक 29.06.2012 को आयोजित एक राजभाषा कार्यशाला में संस्थान के समस्त तकनीकी अधिकारियों के समक्ष यूनिकोड प्रयोग का प्रदर्शन किया गया। प्रमुख वैज्ञानिक श्री आर.एस. अहिरवार ने स्टाफ के समक्ष अनुप्रयोग के सैद्धांतिक तथा व्यावहारिक पक्षों पर प्रकाश डाला।

संसदीय समिति की बैठक

संसदीय राजभाषा समिति की दूसरी उपसमिति ने 6 फरवरी, 2013 को सी. एस. आई. आर. – एम्प्री में भारत सरकार की राजभाषा नीति के कार्यान्वयन की स्थिति का निरीक्षण किया। संस्थान ने इस अवसर पर प्रस्तुतीकरण एवं प्रदर्शन के माध्यम से समिति को जानकारी दी।

ANNEXURE

Staff News

Higher Education

Dr. S. Murali, Principal Scientist awarded Ph.D. on his work on "Development of Energy Model for Agro-residues and Assessment of their Power potential for Environmental Management" from Maulana Azad National Institute of Technolgy, Bhopal.

Dr. Manish Mudgal, Principal Scienctist awarded Ph. D. on "Development of Treatment Technology for Solidification and Stabilization of Hazardous Waste from Metal Processing Industries" from Rajiv Gandhi Proudyogiki Vishwavidhyalaya Bhopal.

Dr. R. K. Soni, Technical Officer awarded Ph. D. in "Geological and Hydro geological Studies for Rural Resources Development and Management of Ghughari Block Mandla District Madhya Pradesh with The Help of Remote Sensing GIS and People Participation" from Awadesh Pratap Singh Vishwavidyalay, Rewa.

Joining

Dr. Jamana Prasad Chaurasia, Senior Scientist joined AMPRI Bhopal on 02.05.2011 on transfer from CSIR HQ, New Delhi

Prof. B. K. Mishra, Director IMMT, Bhubaneswar took over the additional charge of Director, AMPRI, Bhopal on 31.07.2011

Sh. Neelesh Jaiswal, Asst. G, Gr.-I joined AMPRI, Bhopal on 01.08.2011 on transfer from CSIR HQ, New Delhi

Shri Satanand Mishra, Junior Scientist joined AMPRI on transfer from CMERI, Durgapur on July 16, 2012

Shri Bhag Singh Shiksharthi joined on 11.3.2013 on promotion as Stores and Purchase Officer

Shri Ajay Kumar joined on 21.3.2013 on promotion as Finance and Accounts Officer

Transfers

Sh. Sanjay Vinodiya, Assistant. (F&A) relieved on 13.07.2011 to join NEERI, Nagpur on Promotion.

Dr. M. J. Nandan, Sr. Scientist relieved on 21.10.2011 to join NGRI, Hyderabad.

Lien

Sh. K.K. Rao, Sr. Tech. Officer (1) relieved from AMPRI, Bhopal on 30.12.2011 to join Central University of Odisha as Deputy Registrar on lien.

Sh. S. Bhawsar, Sr. Hindi Translator relieved from AMPRI, Bhopal on 18.11.2011 to join Bank Note Press, Dewas on lien.

Dr. K.K. Pathak, Principal Scientist relieved from AMPRI, Bhopal on 28.07.2011 to join NITTTR, Bhopal as Professor-Civil (Structural Engineering) on lien.

Resignations

Sh. B. Diwakar, Security Officer, relieved on resignation on 16.08.2011

Retirements

Dr. A. H. Yegneswaran, Chief Scientist retired on superannuation on 30.04.2011.

Dr. Anil. K. Gupta, Director relieved from AMPRI, Bhopal after taking voluntary retirement on 31.07.2011.

Sh. S.P. Pathak, Principal Scientist retired on superannuation on July 31, 2012

Dr. Alok Kumar Gupta, Sr. Principal Scientist retired on superannuation on July 31, 2012.

Assessment Promotions

Sh. Meraj Ahmed	Jr. Scientist to Scientist
Sh. M.D. Goel	Jr. Scientist to Scientist
Dr. G.K. Gupta	Jr. Scientist to Scientist
Dr. J.P. Chaurasia	Scientist to Senior Scientist
Sh. Akram Khan	Senior Scientist to Principal Scientist
Dr. K.K. Pathak	Senior Scientist to Principal Scientist
Dr. Murari Prasad	Principal Scientist to Sr. Principal Scientist
Dr. S.K. Sanghi	Principal Scientist to Sr. Principal Scientist
Dr. D.P. Mondal	Principal Scientist to Sr. Principal Scientist
Sh. R.K. Soni	Sr. Tech. Officer(1) to Sr. Tech. Officer(2)
Sh. M.K. Jain	Ex-Sr. Tech. Off.(1) to Sr. Tech. Officer(2)
Smt. Sangita Gamad	Tech Assistant to Technical Officer
Sh. R.K. Gurjar	Sr. Technician(1) to Sr. Technician(2)
Sh. Abhay Yadav	Sr. Technician(1) to Sr. Technician(2)
Sh. Md. Rafiq	Sr. Technician(1) to Sr. Technician(2)
Sh. M.L. Gurjar	Sr. Technician(1) to Sr. Technician(2)
Sh. A.Ullah	Sr. Technician(1) to Sr. Technician(2)
Sh. B. Patil	Sr. Technician(1) to Sr. Technician(2)

Sh. D.K. Singh	Sr. Technician(1) to Sr. Technician(2)
Sh. R.C. Malvi	Sr. Technician(1) to Sr. Technician(2)
Sh. L.N. Mehra	Lab Attendant(2) to Lab Assistant
Dr. (Mrs.) Manisha Dubey	Sr. Hindi Tran. to Hindi Officer
Sh. G.S. Yadav	Sr. Technician (1) to Sr. Technician (2) (Retired on 31.01.2011)
Sh. R.K. Chouhan	Sr. Technical Officer (2) to Sr. Technical Officer (3)
Dr. B.K. Prasad	Sr. Principle Scientist to Chief Scientist
Dr. J.P. Barnwal	Sr. Principal Scientist to Chief Scientist
Dr. Mulayam Singh Yadav	Sr. Principal Scientist to Chief Scientist
Dr. S.P. Narayan	Sr. Principal Scientist to Chief Scientist
Dr. S.S. Amritphale	Sr. Principal Scientist to Chief Scientist
Sh. Ranjit Singh Solanki	Sr. Principal Scientist to Chief Scientist
Sh. P. Banarjee	Sr. Technician (2) to Sr. Technician (3)
Dr. Ajay Nayak	Sr. Technician (2) to Sr. Technician (3)
Sh. Manik Chandra	Sr. Technician (2) to Sr. Technician (3)
Sh. A.A. Baksh	Sr. Tech. Officer(1) to Sr. Tech. Officer(2)
Dr. Prabha Padmakaran	Sr. Tech. Officer(1) to Sr. Tech. Officer(2)
Sh. Arun Saxena	Sr. Technician (1) to Sr. Technician (2)
Sh. Laxmi Narayan Sahu	Lab. Attendant (2) to Lab. Assistant
Sh. Satish Kumar Raikwar	Lab. Attendant (2) to Lab. Assistant
Sh. Santosh Kumar Batham	Lab. Attendant (2) to Lab. Assitant
Dr. I.B. Singh	Principal Scientist to Sr. Principal Scientist
Sh. A.K. Singh	Principal Scientist to Sr. Principal Scientist
Dr. P. Asokan	Principal Scientist to Sr. Principal Scientist
Dr. Manish Mudgal	Sr. Scientist to Principal Scientist
Dr. J.P. Shukla	Sr. Scientist to Principal Scientist
Dr. Raghuvanshi Ram	Sr. Scientist to Principal Scientist
Sh. R.N. Bhargaw	Sr. Scientist to Principal Scientist

Financial Upgradation under modified Assured Career Progression (MACP) Scheme

Sh. P.K. Satyanesan	Asst. (G) Gr. I
Smt. Mini Surendran	PS
Sh. N. Vishwanathan	Sr. Stenographer
Smt. Sathi Vijayan	Sr. Stenographer
Sh. R.C. Pillai	Chowkidar
Sh. K.P. Tripathi	Security Guard
Sh. R.N. Pradhan	Security Guard
Sh. G.B. Gurung	Security Guard
Sh. Daya Ram	Safaiwala

Manpower

(as on March 31, 2013)

Prof. B.K. Mishra, Director (Additional Charge)

Group IV	**Dr. Navin Chandra**	Chief Scientist
	Dr. Navin Chand	Chief Scientist
	Sh. P.D. Ekbote	Chief Scientist
	Dr. S. Das	Chief Scientist
	Dr. A.K. Jha	Chief Scientist
	Dr. O.P. Modi	Chief Scientist
	Sh. Ranjit Singh Solanki	Chief Scientist
	Dr. J.P. Barnwal	Chief Scientist
	Dr. B.K. Prasad	Chief Scientist
	Dr. S.P. Narayan	Chief Scientist
	Dr. M.S. Yadav	Chief Scientist
	Dr. S.S. Amritphale	Chief Scientist
	Dr. (Ms) Rupa Dasgupta	Senior Principal Scientist
	Dr. R.K. Morchhale	Senior Principal Scientist
	Dr. S.A.R. Hashmi	Senior Principal Scientist
	Dr. (Ms.) Swati Lahiri	Senior Principal Scientist
	Dr. Murari Prasad	Senior Principal Scientist
	Dr. S.K. Sanghi	Senior Principal Scientist
	Dr. D.P. Mondal	Senior Principal Scientist
	Dr. I. B. Singh	Senior Principal Scientist
	Dr. P. Asokan	Senior Principal Scientist
	Sh. A.K. Singh	Senior Principal Scientist
	Dr. R.K. Rawlley	Principal Scientist
	Sh. R.S. Ahirwar	Principal Scientist
	Dr. K.K. Pathak (On lien)	Principal Scientist
	Sh Mohd Akram Khan	Principal Scientist
	Dr. J.P. Shukla	Principal Scientist
	Dr. Manish Mudgal	Principal Scientist
	Dr. Raghuvanshi Ram	Principal Scientist
	Sh. H.N. Bhargaw	Principal Scientist
	Sh. S. Shrimanth	Principal Scientist
	Dr. (Ms) Deepti Mishra	Senior Scientist
	Dr. Sanjeev Saxena	Senior Scientist
	Dr. S. Murali	Senior Scientist
	Dr. J.P. Chaurasia	Senior Scientist
	Sh. R.K. Bharilya	Senior Scientist
	Dr. Sanjay K. Panthi	Scientist
	Sh. Meraj Ahmed	Scientist
	Sh. M.D. Goel	Scientist
	Sh. Gaurav K. Gupta	Scientist
	Sh. Satanand Mishra	Junior Scientist

Group III	**Dr. N. Saha**	Sr. Tech. Officer (3)
	Sh. R.K. Chauhan	Sr. Tech. Officer (3)
	Sh. P. Banerjee	Sr. Tech. Officer (3)
	Sh. M. Chandra	Sr. Tech. Officer (3)
	Dr. Ajay Naik	Sr. Tech. Officer (3)
	Dr. Sorna Gowri	Sr. Tech. Officer (2)
	Sh. T.S.V.C. Rao	Sr. Tech. Officer (2)
	Sh. R. K. Soni	Sr. Tech. Officer (2)
	Sh. M.K. Ban	Sr. Tech. Officer (2)
	Dr. J.P. Pandey	Sr. Tech. Officer (2)
	Sh. H.N. Rao	Sr. Tech. Officer (2)
	Dr. E. Peters	Sr. Tech. Officer (2)
	Sh. A.A. Bakhsh	Sr. Tech. Officer (2)
	Dr. Anita Bhusan	Sr. Tech. Officer (2)
	Sh. A. Kulshreshtha	Sr. Tech. Officer (2)
	Dr.(Ms). P. Padmakaran	Sr. Tech. Officer (2)
	Ms. S. Gamad	Technical Assistant
	Sh. Prashant N.	Technical Assistant
	Sh. Md. Safique M	Technical Assistant
	Sh. K.K. Naktode	Technical Assistant
	Sh. Deepak Kumar Kashyap	Technical Assistant
	Sh. B. Barkhaniya	Technical Assistant
	Sh. A.K. Khare	Technical Assistant
	Sh. O.P. Chaurasia	Jr. Engineer
Group II	**Sh. U.M. Lakra**	Sr. Technician (2)
	Sh. R.K. Kosthi	Sr. Technician (2)
	Sh. R.K. Gurjar	Sr. Technician (2)
	Sh. Md. Rafique	Sr. Technician (2)
	Sh. A. Yadav	Sr. Technician (2)
	Sh. M.L. Gurjar	Sr. Technician (2)
	Sh. A. Ullah	Sr. Technician (2)
	Sh. B. Patil	Sr. Technician (2)
	Sh. D.K. Singh	Sr. Technician (2)
	Sh. R.C. Malvi	Sr. Technician (2)
	Sh. A. Saxena	Sr. Technician (2)
	Ms. S.Pal	Sr. Technician (1)
	Sh. S.K. Suryavanshi	Sr. Technician (1)
	Sh. A.K. Asati	Sr. Technician (1)
	Sh. R. Kishore	Technician (2)

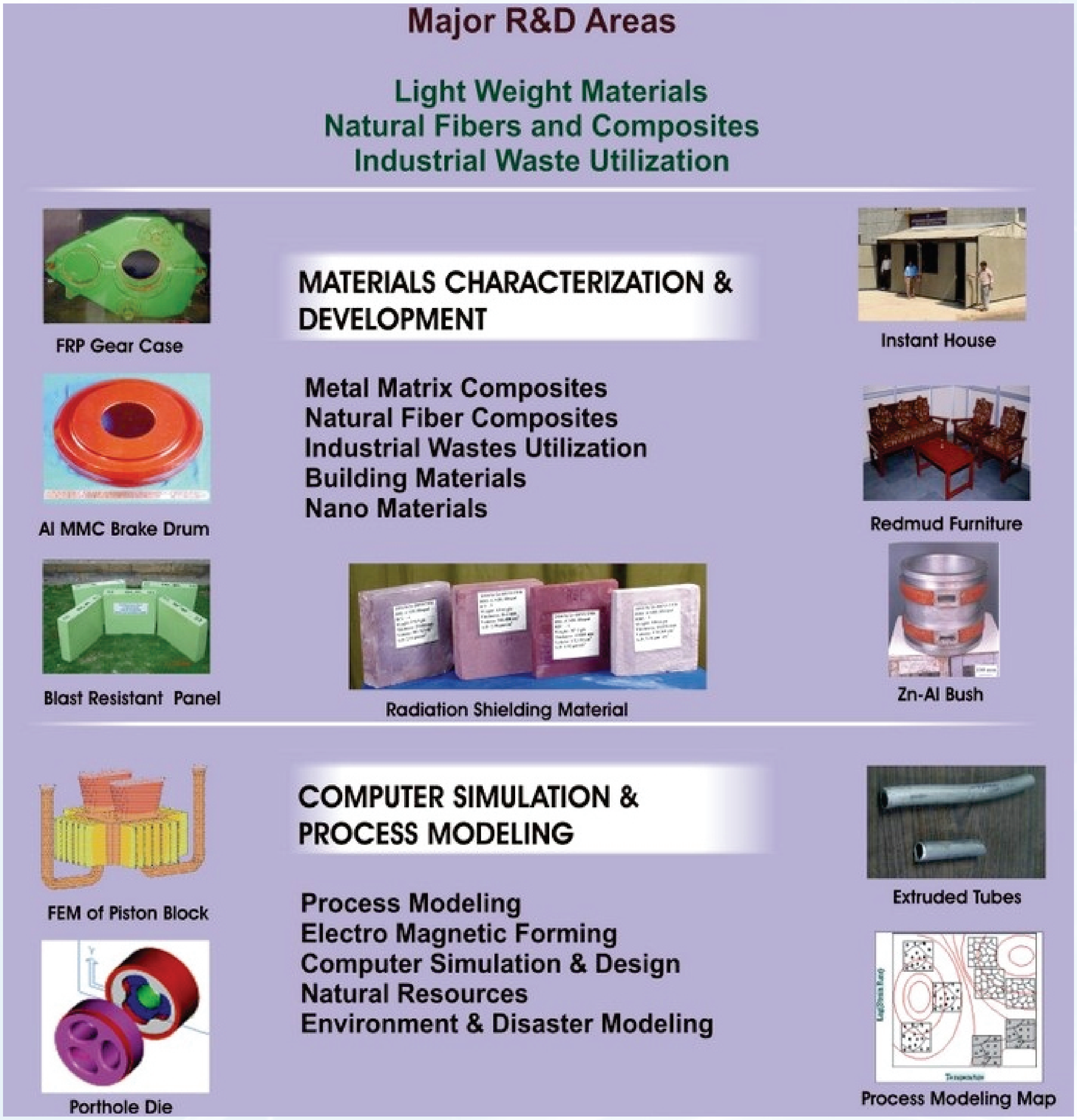
Group I	**Sh. S.K. Raikwar**	Lab Assistant
	Sh. S.K. Batham	Lab Assistant
	Sh. R.D. Kushwaha	Lab Assistant
	Sh. L.N. Mehra	Lab Assistant
	Sh. B.L. Pradhan	Lab Assistant
	Sh. N.S. Jadav	Lab Attendant (2)
	Sh. L.N. Sahu	Lab Attendant (2)
	Sh. Indraj Yadav	Lab Attendant (2)
	Sh. Devilal Rathore	Lab Attendant (2)
	Sh. Anil Gond	Lab Attendant (2)

Administration

Sh. Ram Sarup	COA
Sh. Anjum Sharma	AO
Sh. Bhag Singh Shiksharthi	SPO
Sh. Ajay Kumar	FAO
Sh. P.K. Srivastava	Protocol Officer
Sh. S. Majumdar	SO(General)
Sh. P.K. Sinha	SO(F&A)
Sh. G. Chand	SO(F&A)
Sh. D.P. Singh	SO (S&P)
Sh. A.K. Jain	SO(General)
Dr. (Ms) M. Dubey	Hindi Officer
Ms. S. Soman	Private Secretary
Ms. M. Surendran	Private Secretary
Sh. N. Vishwanathan	Sr. Steno
Ms. S. Vijayan	Sr. Steno
Sh. G.K. Dhakad	Sr. Steno
Sh. D.M. Chilbule	Assistant. (S&P) Gr. I
Sh. P.K. Satyanesan	Assistant (G) Gr.I
Sh. J. Kujur	Assistant (G) Gr.I
Ms. A. Vinodia	Assistant (G) Gr.I
Sh. N.K. Pethari	Assistant (G) Gr.I
Sh. N. Jaiswal	Assistant (G) Gr. I

Sh. V. Nathiley	Assistant (S&P) Gr. I
Sh. A.K. Meshram	Assistant (S&P) Gr.I
Sh. V. Shrivastava	Assistant (F&A) Gr.I
Sh. H. Singh	Assistant (G) Gr.II
Sh. S. Bhawsar (On lien)	Sr. Hindi Translator
Ms. A. Daniel	Receptionist
Ms.T. Rangari	Record Keeper
Sh. K.P. Tripathi	Security Guard
Sh. R.N. Pradhan	Security Guard
Sh. G.B. Gurung	Security Guard
Sh. D. Prasad	Tea & Coffee Maker
Sh. Dayaram	Safaiwala
Ms. A. Golait	Peon

CSIR-AMPRI AT A GLANCE



Cement Free Concrete Structure Demonstrated at CSIR-AMPRI, Bhopal

Technology Available for Commercialization for Cement Free Concrete

Know-How Transfer to M/s JSPL Raigarh for Making Cement Free Green Concrete