

PI & Members:
 Dr T Goswami PI
 Member
 Dr D Kalita
 Mr D Dutta
 Ms Puspa Kr Das

Significant Achievements :

This is a new project work started since April 2012. The expletory investigation of various lignocellulosic materials of NE region, and study on their physicochemical properties are on progress.

GAP

Ion Specificity on the adsorption of well defined organic acids/anions at the solid/water interface

PI & Members:
 Dr S Mahiuddin PI
 Member
 Dr MR Das

Significant Achievements:

Adsorption behaviour of 3,4-dihydroxybenzoic acid in the presence of 0-100 mM NaCl and the specific ion effects on the adsorption exhibit interesting results. Taking the adsorption density at surface saturation as the base value the results indicate that NaCl at 0.05-100 mM is surface specific and decreases the adsorption density of 3,4-dihydroxybenzoic acid onto alumina. Nevertheless the specific ion effects on the adsorption are in tune with the Hofmeister ion series.

Funding Agency:
 DST, New Delhi

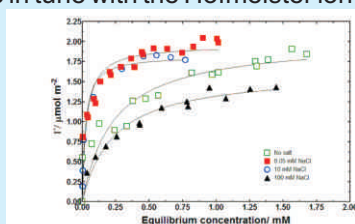


Fig. Adsorption isotherms of 3,4 -dihydroxybenzoic acid in the presence of NaCl of different concentrations.

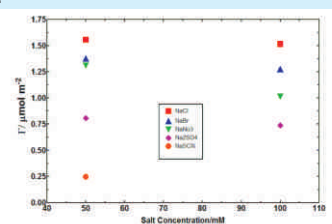


Fig. Variation of Adsorption density of 3,4 dihydroxybenzoic acid in the presence of different ions of different concentrations.

GAP

Emissions from coal based industries-development of predictive models

PI & Members:
 Dr BP Baruah Co-ordinator
 Dr Puja Khare Activity Leader (upto 2011)
 Dr Prasenjit Saikia
 Dr Binoy Kumar Saikia
 Mr Dilip Kumar Dutta
 Mr Tonkeswar Das
Funding Agency :
 Funded by Ministry of Coal, Govt. of India

Objectives:

- ✓ To quantify the particulate matter (SPM, PM_{2.5} and PM₁₀) and toxic gas emissions from coal mining and utilization industries.
- ✓ Chemical characterization and mass size distribution of particulate matter (PM_{2.5} and PM₁₀) from coal based industries.
- ✓ Evolving relationship between the coal quality parameters and emissions.
- ✓ Identification of the factors that contribute towards emission of particulates (SPM, PM_{2.5} and PM₁₀) and toxic gases depending upon the type of mining methodologies and utilization technologies.
- ✓ Emission inventory for coal based industries.
- ✓ Modeling and suggestive measure to regulate the emission from coal mining and utilization industries like coke ovens, mining etc.

Significant Achievements:

The coal mining and coal based industries have serious impacts on human and on overall environment. Presently North East coals are mostly used in coke-oven industries and utilization in the power sector has also been planned. The study provides the preliminary information on the emission characteristics in and around coke oven and mine site to give an overview of both gaseous and particulate characteristics released during the mining and utilization of NER coals. The study also added to the data base on emission inventory in the required as well as material level. Pre-washing of coal before feeding into the coke oven reduces the emission of sulphurous as well as metal components to the environment. Mining emissions not only depends upon the properties of the fuel, but also on the processes of particulate formation and gas to particle conversion during utilization of these fuels. The study will also add to the data base on emission inventory in the required as



well as material level. The emission inventory will further help to develop and implement of policies for protecting human health and the environment regarding atmospheric particulate matters and gaseous emission. Proper combustion of flue gas released during the carbonization process in the coke oven with the addition of secondary air reduces the carbonaceous particulate matter like PAH to a great extent. The project lead to fulfil the gaps in the National Emission Inventory for NER coal based industries.

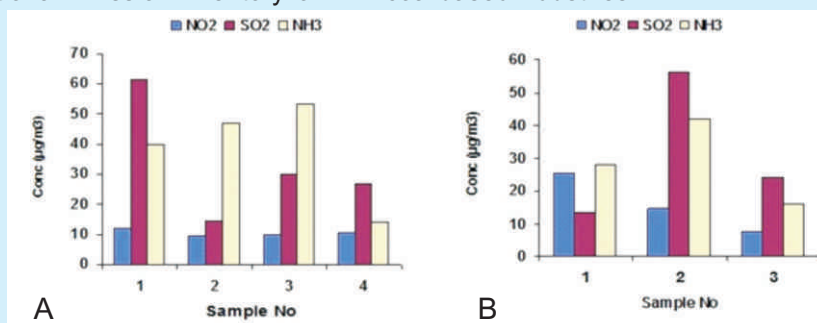


Fig.: Showing gaseous emission from mine site and coke industrial site in A and B respectively.

Fig.: SEM structure of particulate matter of different sizes during coal combustion and coal carbonizations

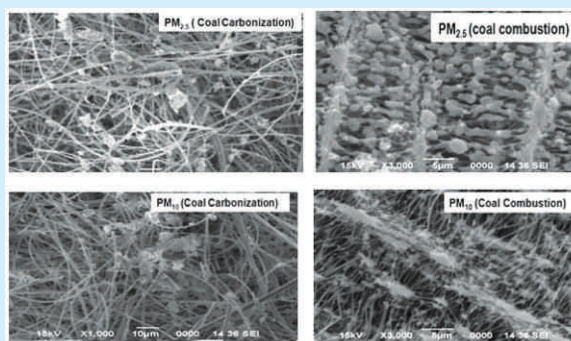
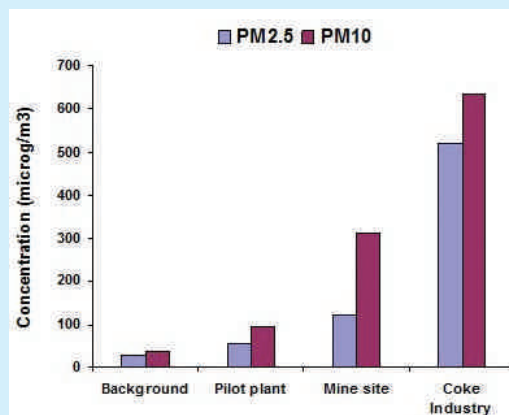


Fig.: Concentration of PM2.5 and PM10 at different sampling sites.



GAP	Planned Development of protocols for utilization of the Tide Land for Brick Manufacturer after analysis of Geo-Consequences of Mining.	
PI & Members: Dr P Sengupta Mr D Bordoloi Member Mr J J Bora Mr V Rajkhowa Mr D Basumatary	PI CoPI	Significant Achievement: During visit to Agartala, three brick field clusters of Tripura viz, Jirania, Udaypur and Belonia, total 31 samples were collected (50 kg each). Preliminary characterizations of collected soils were carried out. Wet chemical analyses, X-ray diffractometry of few samples were also employed. Grain size analysis, chemical compositions and XRD patterns showed that the Tilla and slate soil contains mostly quartz and some amount
Funding Agency: DST, New Delhi		



of kaolinite clay minerals. CSEB were prepared by thorough mixing of soil (collected from Tripura), fine gravels, coarse sand and OPC, then moulded by the machine. Depending upon the mixture composition 20-25% water was added for smooth moulding of the CSEB. The average size of CSEB was 23.0 cm x 11.0 cm x 9.5 cm (LxBxH). Photographs of CSEB process are endorsed. CSEB blocks were categorized into two classes viz. class 20 and class 30, depending on compressive strength. Use of Rice husk (pozzolana) as one mixture component for the manufacture of CSEB is under progress.



Fig. During the Manufacture of Brick by utilization of the Tide Land

GAP	Study on synthesis of novel composite board from coir fibre for engineering application.
<p>PI & Members: Dr Dipul Kalita PI Dr T Goswami Co PI</p> <p>Member Mr JJ Bora Mr D Dutta Ms Puspa Kr Das</p> <p>Funding Agency: Coir Board, Min. of Micro, Small, & Medium Entrepreneurs, Govt of India.</p>	<p>Objectives:</p> <ul style="list-style-type: none"> ✓ Feasibility study and evaluation of possible methodologies of utilizing coir fibers in combination with poly waste materials to synthesize composite boards and converting coir fiber derived bio-precursor to silicon carbide (SiC) based composite ceramics. ✓ Identification of methods for producing poly waste composite boards and biomorphic SiC ceramics using coir fibers. ✓ Characterization of poly waste composite boards and biomorphic SiC ceramics synthesized using coir fibers. ✓ Comparison of properties of composite boards synthesized using coir fiber and poly waste materials and other conventional materials. ✓ Comparison of properties of SiC ceramic composite synthesized using synthetic precursor and coir fiber derived precursor. ✓ Examination of application potential of novel poly waste composite boards and biomorphic SiC composite ceramics as engineering materials. <p>Significant Achievements:</p> <ul style="list-style-type: none"> ● Board samples were made from the mixture of treated coir fibre and different resin binder like waste polyethylene, rosin, cellulose acetate cuttings with satisfactory physical strength properties with minimum water absorbing property. ● Coir fibreboards converted by controlled thermal processing into carbonaceous preforms (carbon templates) maintaining the special morphological and structural features (macro and micro) that are characteristic to the bio-structure ● Four Papers published in SCI journal i.e. Three in Ceramics International, and one in Material Science and Engineering A.



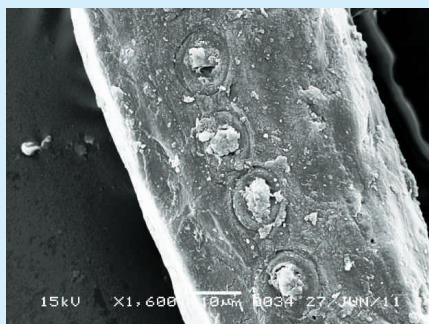


Fig.: SEM of Untreated Coir Fibre



Fig.: SEM of Chemically modified Coir Fibre

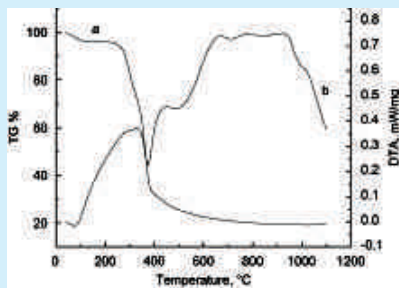


Fig.: Thermal analysis of coir fibre sample in flowing N_2 atmosphere (a) TG and (b) DTA curves

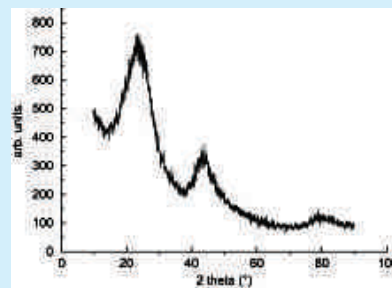


Fig.: XRD- profile of the carbon templates of coir fibre board

GAP

To develop a process of non-glossy borer resistant polymeric composition suitable for application on various bamboo and cane articles.

PI & Members:
 Dr Dipul Kalita PI
 Dr T Goswami Co PI
 Member
 Mr D Dutta
 Ms Puspa Kr Das
Funding Agency:
 DST, New Delhi

Objectives:

- ✓ The prime objective for development of a suitable non glossy, waterproof borer resistant polymer based composition useful for treatment of bamboo/cane handicraft items.
- ✓ The composition developed in the laboratory will be implemented in a professional handicraft industry and observe its performance.
- ✓ To identified and trained the artisans in the institute, implement the technology in their industry and evaluation of quality of the treated articles.

Significant Achievements:

- Selection of suitable solvent and polymer and formulation of the composition.
- Experimental work on development of coating formulation and application on different bamboo and cane craft articles.
- Evaluation of the quality of the treated product as regards mechanical strength properties, waterproofness, borer resistance etc and comparison with the untreated ones.
- Optimization of the process parameters in lab scale.

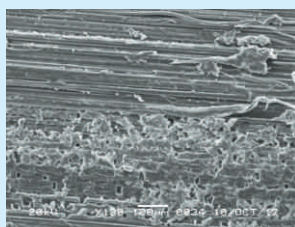


Fig.: SEM of Untreated bamboo (TS)

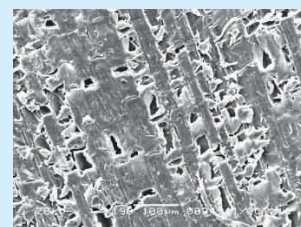


Fig.: SEM of Chemically treated bamboo (TS)

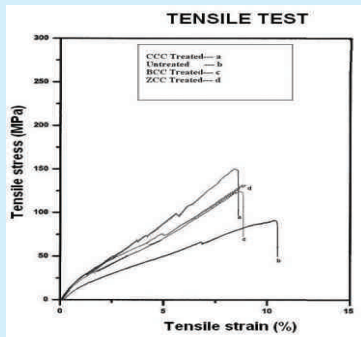


Fig.: Ultimate tensile strength of Bamboo (Treated & untreated sample)

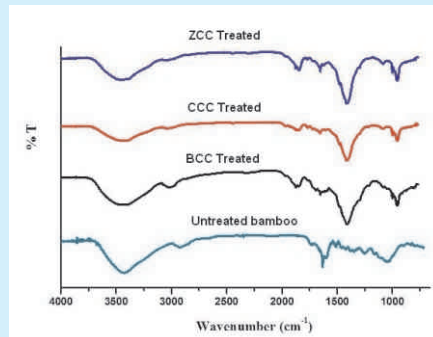


Fig.: FTIR of Bamboo (Treated & untreated sample)

<p>GAP</p>	<p>Development of technology to produce clean coal from high ash and high sulphur Indian coal: Desulphurization of high sulphur NE Indian Coals</p>																																	
<p>PI & Members: Dr B P Baruah</p> <p>Member Dr Pujja Khare Dr Binoy Kumar Saikia Dr Prasenjit Saikia Mr Dileep Kumar Dutta Mr Tonkeswar Das</p> <p>Funding Agency: Ministry of Steel, Govt. of India</p>	<p>PI</p> <p>Objectives:</p> <ul style="list-style-type: none"> ✓ Evaluation/ characterization of sulphur functionalities in high sulphur Assam coals. ✓ Evaluation of effective desulphurization methodologies for quality enhancement with reference to end applications. ✓ Optimization of process parameters for desulphurization of Assam coals. ✓ Removal of mineral matter/ash along with trace and heavy metals from coals during process steps. ✓ Sulphur mapping for NE coals. ✓ Scale up and pilot plant trials. <p>Significant Achievements: Physico-chemical properties of high sulphur Assam coals along with Petrographic characterizations of different coalfields of North East India are also carried out. Different suitable chemical processes were evaluated for Desulphurization of NE Indian coals:</p> <p>i) Oxidation in presence of per acids (ODS) / Single step desulphurization: Oxidation in presence of per acids showed 22.58% removal of total sulphur from Assam Coals.</p> <p>ii) By using metal salts/oxides in the oxidation step with Peracids: Oxidative desulphurization in presence of different metal salts/oxides like Al_2O_3, $Al_2O_3/HMoO_4$, $NiCl_2$ and $SnCl_2$ were observed to be increase to different extent for Assam Coals. Desulfurization and deashing have been reported in Figure 10.</p> <p><i>Fig.: percentage of Desulphurization & percentage of deashing of oxidized coal samples in presence of different Metal ions/oxides</i></p> <table border="1"> <caption>Data for Figure 10: % Deashing and % Desulphurization</caption> <thead> <tr> <th>Sample</th> <th>% Deashing</th> <th>% Desulphurization</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10</td> <td>30</td> </tr> <tr> <td>2</td> <td>15</td> <td>30</td> </tr> <tr> <td>3</td> <td>25</td> <td>35</td> </tr> <tr> <td>4</td> <td>30</td> <td>40</td> </tr> </tbody> </table> <p>iii) Oxidation with Peracid in Ionic liquids (IL's): ODS in Ionic liquids (IL) 1 & 2 was also observed to improve desulphurization by significant amounts for Makum Coals.</p> <p><i>Fig.: percentage of Desulphurization & percentage of deashing of oxidized Tirap Coal samples in presence of different ionic liquids.</i></p> <table border="1"> <caption>Data for Figure 11: % Deashing and % Desulphurization</caption> <thead> <tr> <th>Sample</th> <th>% Deashing</th> <th>% Desulphurization</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>45</td> <td>35</td> </tr> <tr> <td>2</td> <td>15</td> <td>40</td> </tr> <tr> <td>3</td> <td>50</td> <td>35</td> </tr> <tr> <td>4</td> <td>20</td> <td>35</td> </tr> <tr> <td>5</td> <td>35</td> <td>35</td> </tr> </tbody> </table>	Sample	% Deashing	% Desulphurization	1	10	30	2	15	30	3	25	35	4	30	40	Sample	% Deashing	% Desulphurization	1	45	35	2	15	40	3	50	35	4	20	35	5	35	35
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ANNUAL REPORT : 2012-2013



Evaluation of chemical processes suitable for Desulphurization of NE Indian coals:

i) Oxidative sulphur removal from coal in oxygen and alkali medium:

oxidation with oxygen gas in alkaline medium has reduced sulfur & ash to 29.15% and 36.39% respectively.

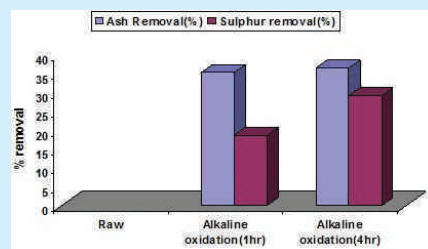


Fig. : Desulphurization and Deashing of oxidized coal samples

ii) Desulphurization and Deashing by ultrasound treatment:

NER coal samples, treated at maximum temperature of 60°C and a pulse time of 4 sec by the Ultrasonic Processor (Sonapros PR-1000 M) in presence of water and alkali. The oxidized coal samples were further extracted with alkali. The result obtained is shown in bar diagram.

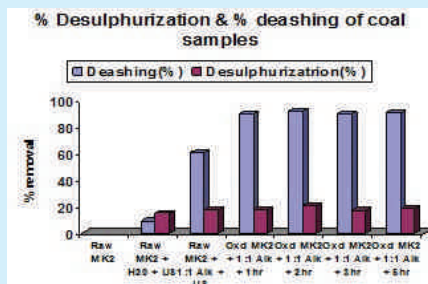


Fig. : Desulphurization & Deashing of ultrasonicated and alkali treated coal samples (Nagaland)

The relationship of macerals and Gross Calorific Values (GCV) of coals were also carried out. The Petrographic composition of some high sulphur Tertiary Indian coal samples is determined and their reactivity is predicted. The relationship between maceral contents and Gross Calorific Value (GCV) of these coal samples have been investigated by multi-variable regression analysis. The vitrinite and inertinite contents were found to have a strong linear relationship ($R^2=0.718$ and $R^2=0.810$) with heat values of coal. From this study, calorific values of coals can be interpreted reasonably. These regression curves show a good fingerprint for energy calculations.

- The 500kg/batch reactor is designed and fabricated in the Institute is suitable for multiple processes like,
 1. Desulfurization of Coal.
 2. Desulfurization of Oil.
 3. Humic acid from low rank coals.
- A monograph on “Clean Coal Initiatives Desulphurization of Fuels Abstracts (1972-2011)” Volume-II has been published

GAP	Development of feasibility assessment model for adaptation of underground coal gasification technology in the North-East Region of India
<p>PI & Members: Dr Bimala Prasad Baruah CI Dr Prasenjit Saikia Co-I Dr Binoy Kumar Saikia Co-I</p> <p>Funding Agency: Ministry of Communication and Information Technology</p>	<p>Objectives: Development of feasibility assessment model for adaptation of underground coal gasification (UCG) technology in the North- East Region of India.</p> <ul style="list-style-type: none"> ● Development of gas monitoring and power cut-off system for existing underground coal mines to avoid explosion. ● Development of database related to coal deposits of North- East Region and web-enabling of the information. <p>Significant Achievements: Literature survey, Geological studies and Physico-chemical characterization of the coal from Tipong area were carried out. Compilation of the Abstracts volume on Underground Coal Gasification and its Environmental Impact has been done. Visit to the sites of Makum coalfield (Tipong, Tirap, Ledo and Namdang collieries) for determining the potential site for underground coal</p>

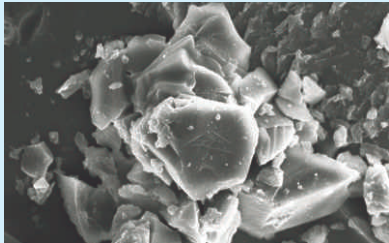
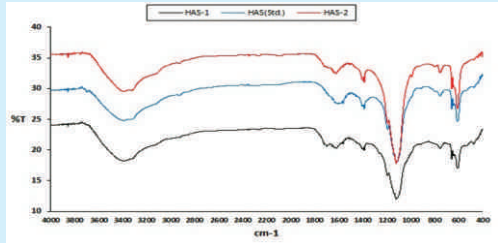
	<p>gasification. Collection of coal samples from Tipong colliery for chemical analysis. Ash analysis of the Tipong coal to study the slagging behaviour and other effects during gasification process</p>
<p>GPP</p>	<p>Hierarchical Porous Solid as Catalyst and Catalytic Support</p>
<p>PI & Members: Dr Lakshi Saikia</p> <p>Funding Agency: DST, New Delhi</p>	<p>Significant Achievements: A nanoporous SBA-15 is synthesized by hydrothermal method using non-ionic block copolymer P-123 as structure directing agent in acidic medium. The synthesized SBA-15 is the starting material for the preparation of hierarchical porous silica. The material is characterized by powder XRD, FT-IR and transmission electron microscope (TEM) and confirmed about the formation of the material. The average pore diameter is found to be about 9 nm from TEM study. This porous material is also used as support / shell for the generation of magnetic Fe₃O₄ nanoparticles. The composite of Fe₃O₄ and SBA-15 was prepared by post-synthetic method, wherein, the magnetic nanoparticles are well dispersed on the support. It is also observed from TEM that some of the Fe₃O₄ particles are encapsulated inside nanopores. Different compositions of Fe₃O₄-SBA-15 are prepared, characterized and catalytic evaluation is in progress for Biginelli reaction.</p> <div data-bbox="1025 351 1430 541" data-label="Figure"> </div> <p><i>Fig. TEM picture and XRD pattern of synthesized SBA-15</i></p>
<p>GPP</p>	<p>Solution Chemistry Approach for Synthesis of Metal Nanoparticles on the Graphene Oxide/Graphene Nanosheets</p>
<p>PI & Members: Dr Manash Ranjan Das</p> <p>Funding Agency: DST, New Delhi</p>	<p>Significant Achievements: A composite material consisting of silver nanoparticles (Ag NPs) deposited on graphene oxide (GO) nanosheets is prepared by chemical reduction of Ag metal ions by sodium borohydride (NaBH₄) in the presence of trisodium citrate acting as a stabilizing agent to prevent agglomeration of the nanoparticles. The synthesized GO/Ag NPs composite was characterized by UV/visible spectroscopy, X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD) and transmission electron microscopy (TEM). TEM analysis confirmed a high density of Ag NPs on the GO nanosheets with a particle size range of 2-25 nm. The activity of the GO/Ag NPs suspension as an antibacterial agent against Gram positive bacteria <i>Staphylococcus aureus</i> and <i>Bacillus subtilis</i> was investigated. The percentage of the killing bacterial colonies by Ag NPs (without GO) is found to be 96-97% while 100% of killing bacterial colonies is only obtained using GO/Ag NPs suspension. Moreover, it was also observed that leakage of sugar and protein from the cell wall of both <i>Staphylococcus aureus</i> and <i>Bacillus subtilis</i> in interaction with GO/Ag NPs suspension is higher compared to Ag NPs (without GO) and GO nanosheets.</p> <p>The synthesis of Au NPs-reduced graphene oxide (rGO) composites by microwave irradiation approach using mild reducing agent, ascorbic acid has been investigated. The formation of Au NPs-rGO composites was</p> <div data-bbox="1037 1080 1463 1332" data-label="Diagram"> </div> <p><i>Fig. Graphical representation of the GO/Ag NPs and its antimicrobial activity</i></p>



confirmed by UV/Vis spectroscopy, X-ray diffraction (XRD) analysis, Small angle X-ray scattering, Transmission electron microscope (TEM), DRIFT Spectroscopy, Thermogravimetric analysis (TGA). The surface plasmon resonance (SPR) band of the Au NPs was appeared at around 545 nm. TEM analysis results show that the formation of the Au NPs on rGO nanosheets in the range of 2-16 nm which also supported the SAXS analysis results. *The synthesized Au NPs-rGO composite materials were utilized for the catalytic investigation. It is successfully applied for the aerobic oxidation of benzyl alcohols to their corresponding aldehydes with good yields. This oxidation process is halogen-free and was carried out in green solvent water.*



Fig. Graphical representation of the synthesis of Au NPs-rGO composites and its catalytic activity

CNP	Feasibility studies for manufacturing of soil conditioner from coal and coal waste.
<p>PI & Members : Dr B P Baruah PI Member Dr Binoy Kumar Saikia Dr Prasenjit Saikia Mr Dilip Kumar Dutta Mr Tonkeswar Das</p> <p>Funding Agency : DGM, Nagaland</p>	<p>Objectives: For agricultural application of low grade Nagaland coal and coal waste</p> <p>Significant Achievements: The coal derived humic acid prepared by oxidative method from non-caking Nagaland coals has met the standard of International Humic Acid Substance Society (IHASS). The product is found suitable for agricultural and effluent treatment purposes.</p>
	
<p>Fig.: SEM image of coal derived humic acid</p>	<p>Fig.: FTIR of Coal derived Humic Acid and Standard Humic Acid</p>

Management Sciences

MLP	Strategic R&D Management initiatives for incremental process of innovation
<p>Funding Agency: CSIR, New Delhi</p> <p>Study on Infrastructure Availability in North East Region of India for Innovative Research on Medicinal Plant Resources (INFORM).</p> <p>PI & Members: Dr PC Neog PI Member Dr Jatin Kalita Ms Kalyani Medhi</p>	<p>Objectives:</p> <ul style="list-style-type: none"> ✓ To support with database & information on infrastructure facilities for innovative R&D programmes. ✓ Identification & strategic planning for ensured conservation of plants resources which are in high trade. ✓ Reviewing of technology intensive infrastructure capacity of R & D institution in this region of the country and scope of strengthening thereof.

Mr Madhurjya Saikia
Mr Atul Gayan

IPR Sensitization in North East Region through training and print media

PI & Members:

Ms I Ilika Zhimo PI
Mrs Pramila Majumdar Co-PI
Member
Dr R L Bezbaruah
Dr/(Ms) Dipanwita Banik
Mr Probin Baruah
Mr Paresh Saikia

Programme to augment & rejuvenate youth through training for economic, social & holistic development (PRAGJYOTISH)

Development of software package for streamlining management of S&T data in R&D institutes

Significant Achievements:

- Developed a questionnaire to collect information on the infrastructure facilities available in different R&D and higher educational institutes in NE region, which has been already selected.
- Literature survey on medicinal plants of NE states for preparing a database on the same.

Objectives:

- ✓ To conduct a one-day Training/Workshop for 50-100 participants (college level students).

Significant Achievements:

Organised a one-day Workshop cum training programme on “IPR Sensitization in North East Region” on 13 February, 2013 at CSIR-NEIST for the students, entrepreneurs, faculty etc from the state of Assam and Nagaland.

Significant Achievements :

- Apprentice Training Programme
- Training Programme / Project Work for the Students of different institute / universities
- Faculty Training and Motivation and Adoption of School and Colleges by CSIR labs – 3 workshops
- Multi-skill training programme for Group D Employee of the Institute held during 21-22 August at NEIST-Jorhat
- Training for Scientist and Officials, outside CSIR-NEIST, Jorhat

CNP

PI & Members:

Dr Jatin Kalita PI
Dr T Goswami CoPI
Dr Dipul Kalita CoPI

Funding Agency:

Coir Board, Ministry of Micro, Small & Medium Enterprise, Govt. of India

Techno-Economical Studies of Six Technologies under Coir Board In North Eastern States and Organization of Two Seminars

Objectives :

- ✓ Technical evaluation of the know-how/technology developed by an R&D institution.
- ✓ To broadly specify the plant and machinery and other facilities required.
- ✓ Assessment of demand of the product to be produced & the likely investment required.
- ✓ Financial analysis of the proposed technology/venture to broadly determine whether the project is economically viable.

Significant Achievements:

The techno-economical studies of the six identified coir technologies have been studied in NE states. Most of the technologies are feasible in Assam & Tripura state, as these two states produce considerable amount of coconuts. Under the project two seminars were organised to popularize the technologies among unemployed youth, entrepreneurs, NGOs & SHGs in Assam & Tripura.



BASIC RESEARCH

1. Rh (I) - Carbonyl complexes of N,O donor ligands: Synthesis, Reactivities and Catalytic carbonylation reaction

The dimeric rhodium precursor $[\text{Rh}(\text{CO})_2\text{Cl}]_2$ reacts with the ligands (L) quinoline-2-carboxylic acid or quinoline-8-carboxylic acid in 1:2 mole ratio to afford complexes of the type $\text{cis-}[\text{Rh}(\text{CO})_2\text{ClL}]$. The complexes have been characterized by different analytical technique. The complexes undergo oxidative addition with different electrophiles such as CH_3I , $\text{C}_2\text{H}_5\text{I}$ and I_2 to give Rh(III) complexes. OA of the CH_3I with complexes forms relatively stable acyl intermediate which is evident from IR spectroscopy. The complexes show higher catalytic activity for carbonylation of methanol to acetic acid and methyl acetate.

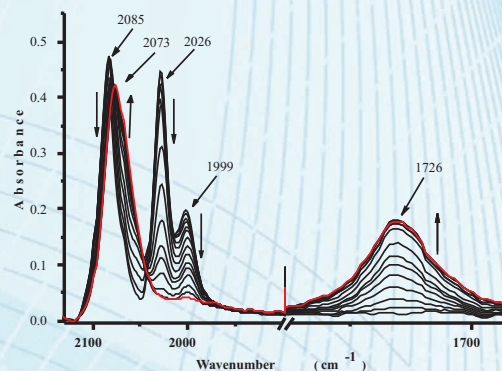
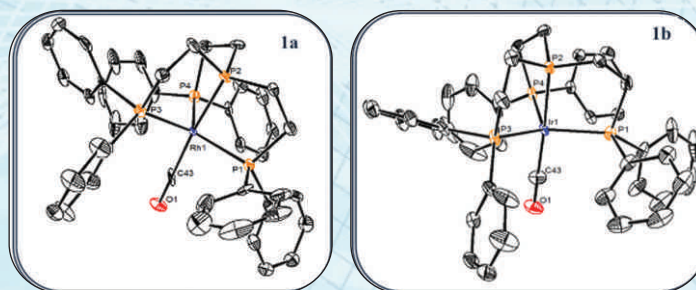


Fig.: Showing series of IR spectra illustrating intermediate's band at 2026 cm^{-1}

2. Synthesis, characterization and catalytic activity of Rh(I) and Ir(I) carbonyl complexes towards Hydroformylation of olefins

New cationic carbonyl complexes of the type $[\text{M}(\text{CO})\text{L}]\text{Cl}$ (1) [$\text{M} = \text{Rh}$ (a) and Ir (b); $\text{L} = \text{P}'(\text{CH}_2\text{CH}_2\text{PPh}_2)_3$] have been synthesised by reacting the dimeric precursors $[\text{MCl}_2(\text{CO})_2]_n$ with the ligand $\text{P}'(\text{CH}_2\text{CH}_2\text{PPh}_2)_3$ in 1:2 mol ratio. The synthesised complexes were characterised by various spectroscopic techniques along with the single crystal X-ray diffraction. In both the complexes, metal (Rh or Ir) occupies the centre of a distorted trigonal bipyramidal environment where the CO group occupies the axial position *trans* to P' . The complexes were found to be very stable and inert towards the oxidative addition (OA) of small molecules like CH_3I , $\text{C}_2\text{H}_5\text{I}$ and I_2 at room temperature as well as at higher temperature. However, the complexes were found to be active towards the hydroformylation of alkene to the corresponding aldehydes under the reaction conditions: Pressure 35 ± 2 bar, temperature $80 \pm 2^\circ\text{C}$, 500 rpm and time 5-8 h.



3. Catanionics: structural transition

Aqueous mixtures of anionic and cationic surfactants, so-called catanionics, on solubilisation yield aggregates whose stability increases by adding alcohols of different chain lengths. The catanionics composed of sodium dodecyl sulphate (SDS) and cetyltrimethylammonium bromide (CTAB) mixtures at 70:30 mole% produce vesicles at higher temperature ($> 30^\circ\text{C}$) followed by structural transition in the temperature range $26\text{--}30^\circ\text{C}$ and finally micelles are formed at lower temperature ($< 26^\circ\text{C}$). These interesting observations are reflected in specific conductivity and hydrodynamic diameter. Additional properties are being studied for further confirmation.

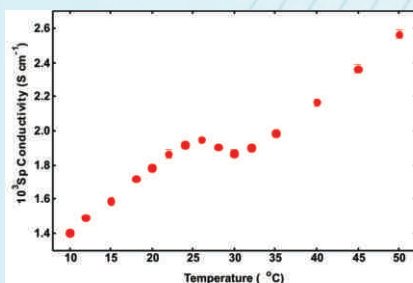


Fig. Variation of sp conductivity of 70 mole% SDS + 30 mole% CTAB exhibiting structural transition in the temperature range $26\text{--}30^\circ\text{C}$.

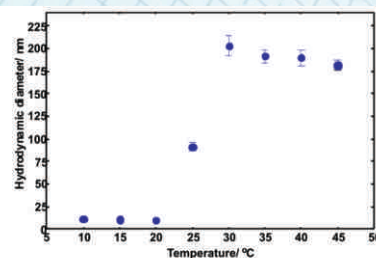
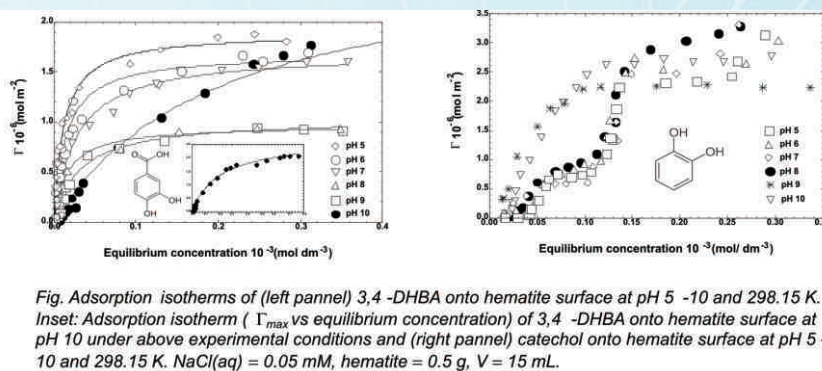


Fig. Variation of hydrodynamic diameter of 70 mole% SDS + 30 mole% CTAB exhibiting structural transition in the temperature range $26\text{--}30^\circ\text{C}$

4. Adsorption of 3,4-dihydroxybenzoic acid and catechol onto hematite surface

A comparative adsorption kinetics, isotherms, dissolution and surface complexation of 3,4-dihydroxybenzoic acid (3,4-DHBA) and 1,2-dihydroxybenzene (catechol) at the hematite/electrolyte interface were investigated. The kinetics at pH 10 and 298.15 K suggested that the adsorption behaviour of 3,4-DHBA and catechol onto hematite surfaces is similar and attain same equilibration time of 60 min. The adsorption kinetics data of 3,4-DHBA and catechol fit the pseudo-second-order kinetic equation of nonlinear form best. The adsorption density of 3,4-DHBA at pH 9 increases and thereby mimics the behaviour of catechol. The solubility of hematite depends on both pH of the suspension and concentration of adsorbate. The inner-sphere complex is formed by 3,4-DHBA and catechol onto hematite surfaces but the mode orientation is likely to be different in the pH range 5-8 and 9-10. The advance microscopic scanning in conjunction with the vibration spectroscopy would provide better pictorial presentation of the mode of orientation of 3,4-DHBA and catechol onto hematite surface at different pH.



5. Removal of a cationic dye from aqueous solution using graphene oxide nanosheets: Investigation of adsorption parameters

Graphene oxide (GO) nanosheets have been used for the adsorption of methyl green, a cationic dye from aqueous solution. GO nanosheets consist of single layered graphite structure decorated with a number of oxygen containing functionalities such as carboxyl, epoxy, ketone and hydroxyl groups which impart negative charge density to it in aqueous solution at a wide range of pH. Thus, GO nanosheets can be predicted as a good adsorbent material for adsorption of cationic species. The adsorption of the methyl green onto the GO nanosheets has been carried out at different experimental conditions such as adsorption kinetics, concentration of adsorbate, the pH and temperature. The kinetics of adsorption result shows that the adsorption maximum was reached at 60 min and follows the pseudo second-order kinetics. The equilibrium data were fitted well to the Langmuir model. Various thermodynamic parameters such as the ΔG , ΔH and ΔS change were also evaluated. Negative value of ΔG indicates spontaneity of the adsorption process of the methyl green-GO system. This study shows that GO can be successfully utilized for removal of dye from aqueous solution by adsorption process with removal efficiency > 90%. The process is governed by physical adsorption. The removal efficiency is dependent on pH and temperature of the medium. Based on this study, the optimum conditions for effective removal of methyl green by adsorption onto GO nanosheets can be tuned up.

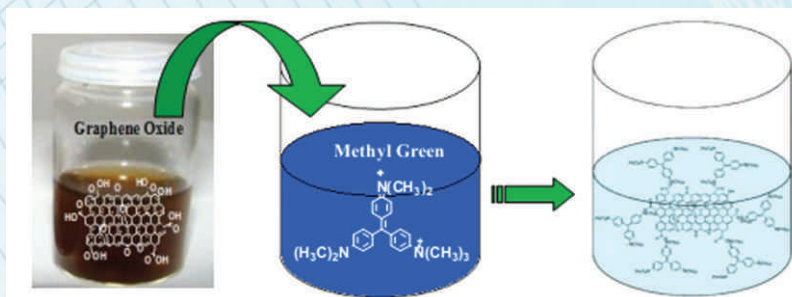


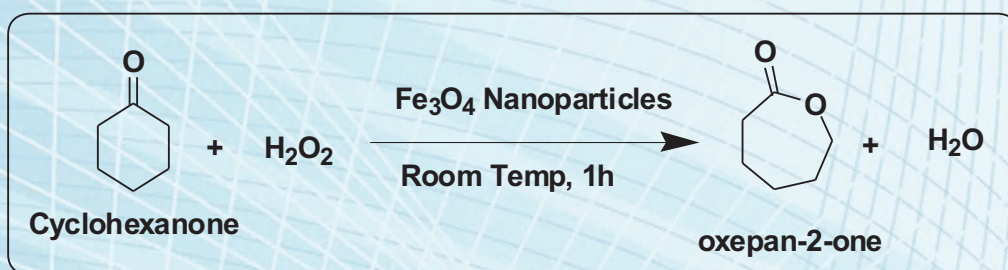
Fig. Graphical representation of the removal of the methyl green, a cationic dye from aqueous solution using graphene oxide nanosheets.

6. Synthesis and Stabilization of Fe₃O₄ magnetic nanoparticles into Modified Montmorillonite Clay: A highly active catalytic system for Baeyer-Villiger oxidation

Fe₃O₄ magnetic nanoparticles were prepared by supporting it on the acid activated Montmorillonite clay and

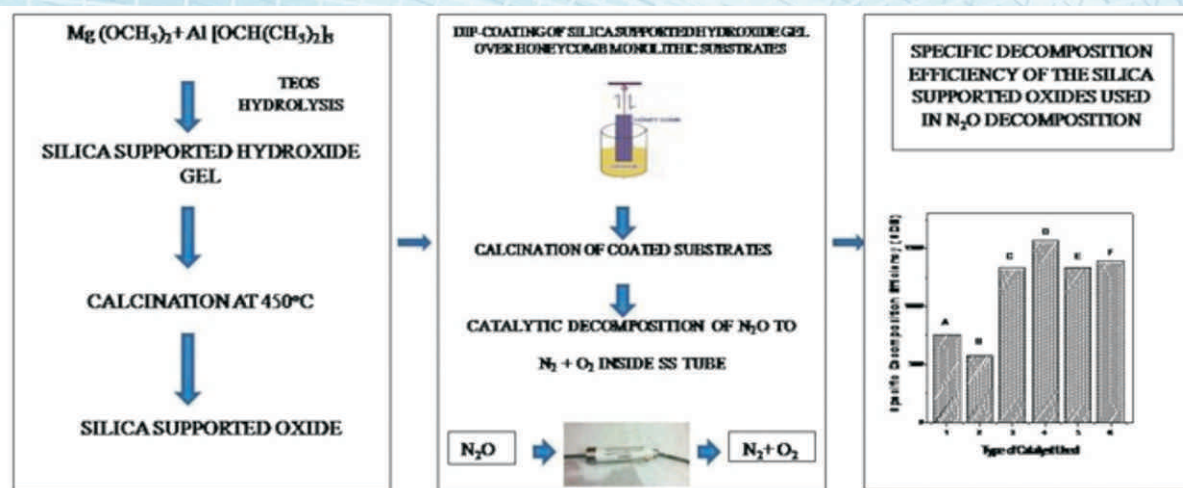


their utilization as a catalyst for oxidation of cyclic ketones (Baeyer-Villiger oxidation) using H_2O_2 as oxidants. The Fe_3O_4 nanoparticles were prepared by treatment of aqueous solution of $FeCl_3$ with $NaOH$ followed by reduction with aqueous $NaBH_4$ solution. The evidence of formation of Fe_3O_4 -nanoparticles was obtained from powder XRD analysis. The Fe_3O_4 -nanoparticles show six peaks at 2θ values 20.76, 30.16, 35.66, 43.08, 57.06 and 62.8° which are assigned to the (111), (220), (311), (400), (511), (440) indices of face centered cubic (fcc) lattice of the Fe_3O_4 nanoparticles. The Fe_3O_4 -nanoparticles serve as efficient green and heterogeneous catalyst for the oxidation of cyclic ketone with excellent yields and selectivity under mild solvent free conditions (Scheme). One of the advantages of this catalytic system no filtration is required to separate the catalyst. The catalyst can be separated from the reaction mixture with the help of magnetic needle retriever.



Scheme: Solvent free oxidation of cyclic ketone by H_2O_2 using Fe_3O_4 Magnetic Nanoparticles as catalyst.

7. Sol-Gel Synthesis of Dispersed Silica Supported Mg-Al LDH Precursor Based Oxidic Catalyst for Decomposition of Toxic N_2O Gas



On silica supporting with the formation of stable Si-O-Si gel network, the LDH system get distributed in the form nano-sheets where otherwise these particles are non-dispersible. This stable gel provided the scope for the formation of thin films over solid surfaces by LBL assembling technique to give devices having the multifunctional nano-oxidic and hydroxidic surfaces. The nano-oxidic surfaces on exposure to environmentally harmful N_2O gas showed efficient catalytic activity of up to 95% decomposition of N_2O to N_2 and O_2 . Such direct decomposition of N_2O at moderate temperatures is a frontier area of research interest aimed to satisfy the mandate of the Kyoto Protocol.

S&T FACILITIES INSTALLED

Coal & Environmental Quality Control Laboratories, Coal Chemistry Division

Ion Chromatography
 Flue Gas Analyzer (CO₂, SO₂, CO)
 Low carbon emission New Designed Coke Oven
 Microwave Digestor
 Remi Mechanical Stirrer (20 Ltres capacity)
 Testo Flue Gas Analyzer
 Hot Air Oven (02 nos)
 Renovated pilot plant
 Water quality assessment equipment
 On line Gas Connection in the laboratory as per internationally accepted code
 LG Microwave Oven
 Nodulizer Pan for Agglomeration Technology



Analytical Chemistry Division

500 MHz NMR Facility installed NEEP Project of Natural Products Chemistry Division

General Engineering Division

100 kW_p Off-Grid Stand Alone Solar Power Plant:

- ▷ Concept to commissioning of 100 kW_p off-grid stand alone solar power plant including preparation of DPR was carried out by General Engineering Division.
- ▷ The total project cost of this project is 270 Lakhs, 90% of which was funded by the Ministry of New and Renewable Energy, Govt. of India.
- ▷ This unique facility is named as *SURUJMUKEHI* and the same was inaugurated by *Prof. Samir K Brahmachari*, the honorable Director General of CSIR (DG-CSIR) on December 26th 2012.
- ▷ Till date up to 60-65% of power requirement of CSIR-NEIST (light, fan, computer etc, excluding heavy machineries and ACs) are fed from this power plant.



Terafil Water Purification Unit (demonstration unit)

Set up of a 5000 litre capacity TERAFIL water purification unit at NASTEC premises, Kohima, Nagaland as a demonstration unit for dissemination in North East India.



CONTRIBUTION TO SOCIETY / ECONOMY

CSIR-800 program

The objective of the programme is to augment the entrepreneurial spirit of communities of the North Eastern states. A Gram Vigyan Kutir (GVK) will be constructed in one of the selected village (TECHVIL) in each state. The TECHVIL will cater to a population of about 40,000 and will be the platform to disseminate appropriate technology solutions. Typical technological assistance will be available for value addition to agricultural product, converting waste to wealth, affordable health, energy efficiency, sustainable energy, potable water and low cost housing. The essence of the programme is to inculcate the belief that appropriate technology solutions exist to improve the quality of their lives.

Distribution of Citronella slips

The CSIR: North-East Institute of Science & Technology, Substation, Imphal has distributed high yielding variety of *Citronella* (Jor-Lab-C2) to 5 Cluster Farmers of Churachandpur district of Manipur (50,000 slips) on September 1, 2012 at the office of the Substation in presence of Shri L Nandakumar Singh, MLA and Shri L Palandro Singh, Director, Agriculture Dept, Manipur.

Training on Banana Fibre Extracting & Processing

A five days training programme on Banana fibre extraction, processing and product development was carried out at CSIR-NEIST, Jorhat during April 2012 for ten entrepreneurs from different NGO's of Manipur state nominated by Manipur small farmers Agri-Business Consortium. In the above programme the extractions and processing of banana fibres by chemical, mechanical and manual methods were demonstrated along with process for softening, bleaching, dyeing etc of the extracted fibres. The development of different products from banana fibres was also shown to the entrepreneurs.



Training programme on "House hold chemicals"

A training programme was conducted at CSIR-NEIST Jorhat on 'House hold chemical' in association with NESSIA on Nov 27, 2012 as per MoU agreement between CSIR-NEIST and NESSIA. In the programme, the process for manufacturing Liquid deodorant was demonstrated to 25 Woman entrepreneurs from Titabor and Borhola area of Jorhat district.



Training programme on "Small scale technologies developed by CSIR-NEIST"

A training programme was conducted at CSIR-NEIST Jorhat on 'Small scale technologies developed by CSIR-NEIST' in association with NESSIA on 4 September 2012 as per MoU agreement between CSIR-NEIST and NESSIA. In the programme, the process for manufacturing Liquid deodorant was demonstrated to 35 Woman entrepreneurs.



DNA Club Activities

(a) Field visit to Loktak Lake, Manipur under DNA Clubs

CSIR-NEIST, Substation, Imphal organized a field visit on 17 April 2012 to Loktak Lake for School students, teachers and experts as a part of the ongoing activities of "DNA Clubs: DBT-TERI Mentoring Schools of Northeast. One student and teacher representative from each 57 DNA Club Schools of Manipur attended the program. The resource persons namely, Prof B Manihar Sharma, Manipur University, Dr H Nandiram Sharma,



Students, teachers, resource persons & LAC Members of DNA Clubs at Loktak Lake, Manipur

Manipur Science Teachers' Forum, Dr Kh Shamungou Singh, Environmentalist, Prof G Tomba Sharma, Former Principal, DM College of Science Imphal, Shri Th Surendranath Singh, Executive Director, Manipur Science & Technology Council, Dr S Shyamjai Singh, Scientist, Loktak Development Authority, Dr BG Unni, Chief Scientist & Director's nominee CSIR-NEIST and Dr HB Singh, Scientist-in-Charge, CSIR-NEIST Substation, Imphal participated at the outdoor programme and delivered lectures on topics like wetlands, biodiversity, water pollution, watershed management, resource management and wildlife including migratory birds at Loktak lake premises. A discussion on different aspects of DNA Clubs and practical demonstrations were also conducted at the Ningthoukhong High School, Manipur.

(b) Distribution of equipments, glassware-chemicals to DNA Club Schools of Manipur



Distribution of Chemicals and Glasswares by the Education Minister (Manipur), Dr.BG Unni, Shri.L.Nandakumar Singh and Dr.H.B.Singh

CSIR-NEIST, Substation Imphal (i) distributed Laboratory equipments to Heirok Higher Secondary School, Manipur (ii) distributed Glassware and chemicals to 57 DNA Club Schools of Manipur and (iii) Demonstrated food adulteration to teachers and students of DNA Club Schools on October 4, 2012. The program was attended by Shri M Okendro Singh, Minister (Education), Manipur, Dr BG Unni , Chief Scientist, CSIR-NEIST and Shri L Nandakumar Singh, MLA, Manipur as Chief Guest, Guest of Honour and President, respectively. The Chief Guest appreciated NEIST Substation's effort for

creating such facilities in various schools as he has stated providing such facilities by State Govt. is difficult. Prof G Tomba Sharma demonstrated laboratory experiments on food adulteration. The program was also attended by all the Local Advisory Members and Dr SK Sinha, Incharge Project Monitoring Unit, Tata Energy Research Institute, North East Region, Guwahati.

Training under CSIR 800

- Training on cultivation of mushroom and production of vermicompost was provided to a four member women group of G-Sector, Naharlagun on 5 September 2012 at NEIST, Branch Itanagar under “CSIR-800 programme” for popularization of Mushroom cultivation in Arunachal Pradesh. 30 bags of spawns was distributed free of cost to the participants.
- Training on Mushroom cultivation technology was held at Garchuk and Rani area, Guwahati during 17-18 May 2012 under the CSIR-800 Programme in collaboration with Ecoconcept. Total of 33 trainees participated.
- An in campus training programme on Mushroom production technology was held at CSIR-NEIST during 6-8 June 2012 under the CSIR-800 Programme. 3 trainees participated in the training from Ecoconcept, Beltola Survey Guwahati with great enthusiasm. They are also trained to prepare mushroom spawn of their own using recent technology. A spawn production unit was supplied to them under CSIR-800 programme.
- A training programme on Mushroom production technology was held on 8 August 2012 under the CSIR-800 Programme in collaboration with DNA Club- A Natural Resource Awareness club under the DBT, GOI at Kalyani High School, Jorhat. Training was imparted to 102 trainees.

Training on Edible Mushroom

- Training organized in collaboration with “Jullang Multipurpose Co-op. Society, Jully Basti, Itanagar” for commercial cultivation of Mushroom and rendered technical guidance for preparation of winter



species of mushroom spawns to the said society. In the training 20 bags of mushroom spawn were provided to the beneficiaries free of cost. Total 10 beneficiaries participated in the training.

- Mr. Wangfyak Wangsu, Proprietor, M/s Tirap Agri Clinic Tirap also trained up on preparation of mushroom culture, preparation of mushroom spawn and bagging of mushroom bags at NEIST Br. Itanagar on 14 September 2012. He also took technical guidance on vermicompost production during the programme
- An entrepreneur Probin Rajkumar at Sarupather, Golaghat Dist, Assam took technical guidance for production of mushroom and preparation of mushroom spawn.
- Two days incampus training on Mushroom cultivation technology was held during 7-8 June 2012. A trainee from NASTEC, Kohima, Govt of Nagaland participated in the training.
- In-campus training was held during 2-6 July 2012 where one trainee from Yanke Multi Purpose Welfare Society, Chukitong, Wokha, Nagaland was trained on techniques of Shiitake mushroom cultivation cum spawn production.



Dr A K Bordoloi delivering his lecture during the theoretical session in training under CSIR-800 programme.



The in-campus trainees with their mushroom compact bags under DSIR-sponsored project.

- Awareness cum training to 106 Rural woman people of west Jorhat area organized on 18 September 2012 funded by DSIR, New Delhi
- Awareness cum training to 76 Rural woman people of west Jorhat area organized on 8 November 2012 funded by DSIR, New Delhi
- In-campus training to 45 participants from the rural SHGs from Malowkhat village organized during 20-23 & 27 November 2012 funded by DSIR, New Delhi.
- In-campus training to 45 participants from the rural SHGs from Kuhumjugonia village organized during 4-8 February 2013 funded by DSIR, New Delhi.
- Mushroom and spawn production training to 11 participants organised in Collaboration with NESSIA at CSIR-NEIST during 11-13 February 2013



NESSIA in-campus training



at Malowkhat village

- To one Project Assistant of Pensioners association organized at CSIR-NEIST during 11 February to 31 March 2013
- Training held at SDAO's office, Bokakhat for 31 participants on 14 March 2013
- Training organized in collaboration with Sri Aurobindo Society, Jorhat and Held at Juvenile Jail for 10 people on 22 March 2013

R&D SUPPORT ACTIVITIES

Human Resource Development

Human Resource is most critical and valuable asset for any organisation, particularly in R&D institute. The HRD Division with its focused objectives of HR development with knowledge management solutions was instrumental in realizing R&D output of the institute. In addition the Division catered to the needs and aspirations of students and teachers of NER in particular and the country in general. The following structured processes were carried out involving Engagement & Induction, Competency Enhancement, Motivation & Training and Learning & Development for achieving the objectives

Structured and customised induction process and S&T management

Research Workers

The Division encouraged young talents to take up steps for joining in the fellowship scheme of CSIR and other funding bodies to carry out basic research in frontier areas of science attracting talents not only from the country but also from abroad. Some researchers, selected at national and international level joined the Institute and are presently working as Principal Investigator (PI) under Women Scientist Scheme (WSS) of DST, Senior Research Fellow and Junior Research Fellow of CSIR, UGC and other funding bodies. The Institute inducted DST Inspire fellow, CSIR-TWAS Fellow and DBT-TWAS Postgraduate Research Fellow and Research Training Fellowships for Developing Country Scientists (RTFDCS) in order to augment the research activities. The Division also arranged to engage a few lecturers/teachers of nearby colleges and Institutes as Guest Workers for research work leading to PhD. The progress was monitored and reviewed periodically for taking up corrective measures and based on the recommendation the fellowship was upgraded or extended.

Academy of Scientific and Innovative Research

The Division is the functionary unit of *Academy of Scientific and Innovative Research* (AcSIR) in the institute and has actively participated in formulation and structured activities of AcSIR, like course curriculum preparation, registration of students, constitution of Doctoral Advisory Committee (DAC), preparation of Provision Grade Report of the students, collection of fees, etc. During the period 8 students enrolled under different Research Fellowship scheme for Ph D courses, of which 6 are continuing.

Project Workers

The Division customised process for attracting young talents in different areas of science through different means and had empanelled sufficient numbers with desired specializations on merit basis. They were engaged, as and when required, in externally funded and CSIR projects of the Institute as well as at its Sub-station, Imphal. During the period 64 Projects Assistants were engaged and altogether 103 Projects Assistants/Project Fellows etc worked in different projects. Moreover, some Project Assistants engaged in earlier years were permitted to pursue for Ph D degree based on entrance test of universities, course work and review of their progress of research work.

Apprentice Training Programme

The institute continued skill development technical training programme for educated youths of the state under Apprentice scheme of GOI. The Division coordinated various programme activities for Graduates and Diploma holders in engineering disciplines and Apprentice training programme under which 1 Diploma holder engineer joined this institute. Under Trade apprentice training programme, 13 ITI qualified candidates in different trade like draughtsman, electrician, welder, fitter, electronic mechanic, plumbers, etc and 4 in laboratories assistant trade were engaged in the institute. The duration of the training period ranged from one to three years.

Training/Project Work for the Students of different universities

The Division arranged facilities for training programme like: summer training, industrial training, practical training, dissertation to selected students of different universities/colleges/institutes of the country under different scientists of the institute. The modules for these programmes are designed, evolved & formulated in-house keeping in view the institutional scientific pursuit and career needs. The duration of the programme



ranged from one month to one year. During the period 160 students of different levels up to postgraduation were permitted to work, of which 119 actually undertook training/project work.

Multi-skill training programme for Group D Employee

The Division organised Multi-skill training programme during 21-22 August 2012 and 19-20 February 2013 for Tech Gr I (1) and Gr D (Non-Technical) employee of the institute to widen their knowledge and skills in different facet of office functioning and to help them, gain a hands on training to operate different office equipments (fax, reprography, computers, etc.) in line with CSIR vision and mission. The programme was initiated as per 6th pay commission recommendation where Gr D employee who are under matric, has to undergo Multi-Skill training so that they may qualify as multi skilled workforce and qualify for pay band 1 with grade pay of Rs. 1800.00. Up-gradation of the scale and fixation of pay of the successful trainees was initiated. Feedback analysis was undertaken for training held during 21-22 August through filled in questioners received from the reporting officer of the employees. The relative grading in five point index [from Six to Ten], taking Five to be the original index point before the training was received from the reporting officers of the participants. The average relative improvement works out to be 7.695 in a ten point scale which shows 53.9 % relative improvement in work proficiency.

Training for Scientist and Officials, outside CSIR-NEIST

The Division regularly interacted with HRDC, CSIR and also with other institutes/organizations for need-based training of scientists and officials of the institute and also interacted with the respective scientists and officials.

CSIR Scheme of Cash Award to Bright SC/ST Students

CSIR-New Delhi introduced a scheme of Cash Awards to motivate Bright SC/ST Students to take up science studies at +2 / Junior College level. For implementing the scheme, the Division interacted with the State government authorities of north-eastern states for nominating the bright SC/ST students for the programme. Altogether, 18 SC/ST students who passed Class X in 2012 from State Boards of NE states were nominated, of which four students along with escorts participated. Some students could not attend due to routine examination. The students visited different laboratories of Institute to familirise with research activities. The Cash award along with a certificate was given to the students at a function held on September 24, 2012.

Established network with other organizations to promote research / studies and skill upgradation

Nomination for Awards / Fellowships

The Division examined the proposals received and altogether sent 3 nominations of the scientists and technologists for different awards & fellowship.

University linkage to promote research

The institute signed MOU with different research institutes and universities of NER to augment the basic research in frontier areas of science. The institute is also one of the authorised research centre of different universities of the Region and the Division regularly interacted with different Universities regarding Ph D registration, course-work, grading, etc. During the period 12 research workers were awarded Ph D degree by Dibrugarh University & Gauhati University.

International Scientific Collaboration:

Professional exchange of scientists is an important tool for cross-fertilization of ideas which helps in formulating bi-lateral and multi-lateral research projects and the Division played an active role in the same. The proposals were examined critically, interaction was made with different organizations for deputing scientists and technologists aboard, and the Division also interacted closely with ISTAD, CSIR during the process, which also include monthly reporting of foreign visits of scientists and officials. During the period scientists were deputed to visit countries like Malaysia, China, Vietnam, Czech Republic, Japan, Thailand and Spain under different programmes.

Societal and Strategic Development

S&T Infrastructure Support to the Colleges of North-Eastern Region

The DST, New Delhi announced a special package for NER with the objective including renovation of the

infrastructure, strengthening S&T teachings and researches at college level and making the colleges a source of generating high caliber manpower and repositories of national intellectual wealth in S&T sector, which in turn will lead to the HR development of NER in particular and country in general. CSIR-NEIST is acting as a Central Agency for the facilitation of the same and the Division has been assigned the task of implementing the project activities in 58 colleges of North-East India belonging to 10 universities. As the volume of the project accomplishment being more (40% of the total project work), the supply and installation of the teaching lab equipment were undertaken this year and the equipment worth Rs. 870.00 lakhs were supplied to the colleges by the vendor.

Other Activities

Research Council

The Division carried out different activities of the Research Council (RC) of the institute. During the period the approved minutes of the 44th RC meeting was sent to CSIR Hqs. and action to be taken on recommendations were circulated to different divisions of the institute for follow up actions. The 45th RC meeting was organized at CSIR-NEIST, Jorhat and Sub-Station, Imphal during 15-17 November 2012 and the 46th RC meeting was organized at CSIR-NEIST during 14-15 March 2013.

Combined Administrative Services Examination 2013

The Division co-ordinated activities for the conduct of Combined Administrative Services Examination 2013 held on 31 March 2013 of the Human Resource Development Group, CSIR, New Delhi at JB College, Jorhat for the centre Jorhat 1 (Arts Block) and Jorhat 2 (Science Block). Altogether, 766 applicants registered, out of which 189 applicants appeared.

National Children Science Congress 2012

The Division co-ordinated activities towards organizing Orientation Programme for Teachers of KV's for National Children Science Congress 2012 held at CSIR-NEIST on 14 September 2012. The Principals of KV's of upper Assam participated in the programme.

Regional Level Children Science Congress – 2012

The Division co-ordinated nomination of 10 scientists as evaluators for projects of student participants of the Regional Level Children Science Congress–2012, held on November 5, 2012. Arrangement of logistics was also arranged for the Congress.

Database Management

The Division manages and updates databases on manpower of the institute like foreign visit of scientists, Research workers, Ph D recipients, Manpower, Apprentice trainees, etc. Whenever required, reports were sent to different organizations of the country such as, ST Commission of GOI, Parliament Secretariat, New Delhi, etc. The Division furnished information of Group IV scientist to RAB, CSIR on halfyearly basis, visits of scientist abroad to ISTAD, CSIR on a monthly basis.

Right to Information Act 2005

CSIR-NEIST being a national institute of CSIR, New Delhi falls under the ambit of Right to information Act 2005. The Division provided information to the citizens under the Act within the stipulated time. The quarterly report was uploaded on the institute's website and the web-based report was sent to Central Information Commission, New Delhi.

Infrastructure Management:

The Division managed different activities of the Boys and Girls hostel, Guest house and Guest house annexe of the institute. Existing infrastructure of the Guest house was upgraded by adding three new VIP rooms together with lounge, kitchen and dining space. The rooms were inaugurated by the DG-CSIR and Secretary DSIR, Prof Samir K Brahmachari on December 26, 2012.



Information & business Development

As usual the Information & Business Development division continued to serve as the window of the Institute to the outside world and coordinated the overall business development activities of the Institute. The division continued to maintain the liaison activities, both public & industrial houses, entrepreneurs etc who were in need of assistance from the laboratory and also disseminated the expertise and capabilities of the Institute through various means for economic, societal and other benefits of the clients, customers and users. During the year under report the institute was celebrating the Golden Jubilee Year celebration on completion of the 50th year of glorious existence by organizing a series of programmes spanning over the year. Consequently, the division had to be surged and oriented accordingly to deal with this extra load of work particularly publications, publicity, organization of get-togethers, exhibitions, seminars, meetings, etc, in connection with the Golden Jubilee celebration.

Exhibitions Attended

The I&BD division has during the year organized the CSIR-NEIST exhibition stall and participated in the following exhibitions organized on various occasions

1. During Conference on Road and Transportation for North East Region (CORTNE 2013) held at Maniram Dewan Centre during 22-24 February 2013
2. Farmers Day exhibition organized by Assam Agricultural University at Titabor Agricultural Research Station on 6 November 2012
3. CSIR 70 years celebration exhibition held at New Delhi during 26 September 2012
4. Agri Tech India 2012 organized by Media Today Pvt Ltd which was held during 25-27 August, 2012 at Palace Ground, Gayathri Vihar, Bengaluru.
5. International Coir Tech Expo 2012 held during 12-16 August 2012 at Marine Drive, Kochi, Kerala.
6. S&T exhibition of North East Graduate Congress, 2012 organized jointly by University of Science & Technology, Meghalaya and CSIR-NEIST at USTM premises during 29-30 May 2012.
7. Rural Development & Industrial Exhibition held at Bistaram Baruah Hall in December 2012.

Publications

During the period the division brought out the following regular and need based publications on different occasions.

- *Annual Report 2011-12* - The first complete bilingual (Hindi & English) Annual report of the institute was brought out and released on the 70th CSIR Foundation Day celebration on 24 September 2012
- *Highlights 2012-2013* - Highlights 2012-13 of the institute (which is compilation of institutes activities) was brought out and released on the CSIR-NEIST Foundation Day celebration on 18 March 2013
- *NEIST News (Bimonthly Bilingual Hindi-English newsletter)*
- *INFOWATCH (Inhouse Weekly)*
- *Effective Science Writing* - The book was edited jointly by Mrs Pramila Majumdar, Jr Scientist, I&BD Division, CSIR-NEIST and Mr Biman Basu, Science Communicator & Former Scientist, CSIR-NISCAIR, New Delhi. The book was released by Prof Vani Brahmachari during "Way Forward Programme" held on 26 December 2012
- CSIR-NEIST in Manipur - Brochure
- Anti-Arthritis – Herbal Solution of Arthritis - Brochure
- Fungal Infection Treatment. Fungi-Destruct - Brochure
- CSIR-NEIST Affordable Healthcare - Fungi-Destruct - Brochure

Processing of Patent Application :

The division is responsible for processing of the institutes patent application for filing in India and abroad and for this is continuously coordinating with IPMD, CSIR, New Delhi.

Processing of New Project Proposal

The division is also responsible for processing of new project proposals. The proposals so received are forwarded to the respective committee for scrutiny.

Technology Transfer

The division is responsible for the commercialization of the technologies developed by CSIR-NEIST. It is responsible for drafting of technology/knowhow transfer agreement and acts as bridge between the entrepreneur and the division responsible for demonstrating the knowhow package.