CFRI NEWSLETTER

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Established in November 1946, Central Fuel Research Institute is a unique Institute of its kind in India under CSIR, New Delhi to conduct research in different areas of Fuel Science and Technology with emphasis on coal and lignite.

Mission: Enhance the position of the Institute as a premier R&D centre for technology development and transfer by forging strategic alliance with other agencies and continuously strive for excellence in the area of potential expertise for generation of basic knowledge, innovation, and advanced concepts in science and technology for economic, efficient, and environmentally safe energy management

FLYASH-WASTE OR WEALTH

(*Abstract: National Science Day Lecture- Prof. A. Sarkar, Deptt. Applied Chemistry, ISM, Dhanbad)*

Fly ash, a coal combustion residue is the bone of contention amongst a wide cross section of Scientist/Environmentalist across the world. While for some, especially the environmental managers at thermal power plants, it is really a problem to dispose it off. For scientists actively engaged in the utilisation of fly ash, its wealth potential is not yet truly realised. Indian fly ash, though somewhat different from the ash generated in other parts of the globe, has tremendous potential for utilisation in construction industry, agriculture, soil stabilization, paint industry and other value- added product development. The three most important morphological classes present in fly ash are: (a) Cenospheres, (b) Pleurospheres and (c) Ferrospheres. Cenospheres are hollow, ceramic microspheres formed during the combustion of coal. This is probably one of the most important valuable morphological classes found in ash with wide application potential. The possible areas of applications are: in oil well cements, sound proofing, exterior paints, injection modeling of plastics, automotive brake lining and even in the nose of space shuttle used by NASA. The cenospheres are formed at an estimated temperature of 1400^0C, where its formation and size are governed by the viscosity and surface tension of the fused silicate glass, rate of change in particle temperature and rate of diffusion of gases in the silicates. The molten spheres harden at 1000^0C by trapping the gases formed internally through catalytic action of Ferric oxide (Fe_2O_3) or carbonaceous materials present.

Pleurospheres are larger spheres, which encapsulate cenospheres or other particles. Ferrospheres are also hollow spheres and have much similarities with cenospheres. The outer walls are made of alumino-siliceous material, however, various oxides of Iron are deposited on the surface as crystallites. Ferrospheres, apart from having application potential in the coal beneficiation, may possibly be used as catalyst in methane oxidation. Char, another important morphological class found in ash, particularly in Indian fly ash, has lot of potential.

PATENTS FILED IN PCT & INDIA

Method for predicting amount of gas produced during coal gasification
Inventors: B. K. Mall, R. A. Sohony, S. R. K. Rao, S. K .Basu and Kalyan Sen.

PAPER PUBLISHED

Tiwari K K, Basu S K, Bit K C, Banerjee S N and Mishra K K, High-Concentration Coal Water Slurry from Indian Coals using Newly Developed Additives, Fuel Processing Technology, 85(2003) 31-42.

NEW PROJECTS RECEIVED

1. Development of Process for Potential Utilisation of Natural Coke (Jhama) in Industrial Applications *(sponsored by SSRC, CMPDIL, Ranchi, Rs. 40.00 lakhs).*
2. Development of Process/Technique for Potential Utilisation of Less Matured Non-Coking Coal for Making Hard Coke by Utilising Stamp Charging *(sponsored by SSRC, CMPDIL, Ranchi, Rs.98.88 lakhs).*
3. Development of a Cheap and Energy Efficient By-product from Coke Oven for Production of Hard Coke for Steel/Metallurgical Use *(sponsored by SSRC Ministry of Coal, CMPDIL, Ranchi, Rs.286.67 lakhs*).
4. Studies on Impact of Atmospheric Biotic/Abiotic Particulates on the Environment of Jharia Coalfields and their Abatement Strategies *(sponsored by SSRC, Ministry of Coal, CMPDIL, Ranchi, Rs.33.90 lakhs*).
5. Consultancy during Erection, Commissioning of Non-recovery Coke Oven at Cuttack *(sponosored by M/s. M. V. International Ltd., Rs. 4.5 lakhs).*

ECO-FRIENDLY APPROACH TOWARDS AN ALTERNATIVE FUEL: KICKS OFF

In view of limited resources of fuel and its ever increasing demand globally, bio-diesel is presently considered to be one of the alternative fuels for future, where *Jatropha curcas* containing about 35% seed oil as alternative bio-fuel may play crucial role. This plant species has its unique potential to grow in waste/degraded land under rain-fed condition with an estimated production @ 250-4000 kg seed/ha within a span of 2nd to 6th year of plantation & onwards. Such waste/degraded land is abundantly available in Jharkhand State. In this direction, a step has been taken by growing the species of *Jatropha curcas* and *Pongania* spp (Karanj) in the wasteland of CFRI campus, which are growing luxuriantly. The envisaged cultivation of *Jatropha curcas*, in the waste/infertile land of Jharkhand, if successful, will fetch significant amount of revenue after three years of the plantation and will continue up to 70 years or so. Besides, this will not only reclaim/restore the wasteland of the region but have societal and economic impact.

CPYLS PROGRAMME

CSIR programme for youth leadership in science was organized by CFRI on 14 & 15 January 2004. This programme was inaugurated by Prof. Samir Bhattacharya, Director, IICB, Kolkata. He delivered a lecture on 'Why We Do Science'. In this two days programme, twenty-three highly meritorious students of CBSE, ICSC, Jharkhand and Bihar Board participated. The programme aims at attracting best students so that they can devote themselves to basic science by adopting an exciting and rewarding career therein, where the stress is on harnessing rural human resources vital for the growth of country as everything can not be solely based upon the urban talent. The programme covered acquaintance with different ongoing activities of the Institute and visit of Labs, pilot plants and various instruments. Live demonstrations were made for carrying out the experiments. An interaction programme with the students was also arranged.

CSIR AND CFRI INTERACTION

Shri Rudra K. Sinha, Advisor, Ministry of Science and Technology and HRD, Govt of India, New Delhi visited CFRI on 02.02.2004. He had a detailed discussion with Shri P. K. Bandyopadhyay, Scientist 'G' and other senior scientists on various ongoing projects of CFRI and gave many suggestions. He also visited the Labs of XRF & FTIR and pilot plants of Coal Water Emulsion and Fine Coal Treatment.

Interaction in progress
(Sitting L to R : Dr S. K. Srivastava, Shri R. K. Sinha, Shri P. K. Bandopadhyay and Shri S. Kandaswamy)

CONSTITUTION OF NEW RESEARCH COUNCIL

A twelve member new Research Council, the highest advisory body for the R & D and administrative matters, has been constituted for CFRI w.e.f. 1st January 2004 for the tenure of three years. The RC meeting is to be held atleast twice in a year. Prof. R. Natarajan, Chairman, AICTE is the Chairman of Council and the other members are: Prof. R. K. Saha, Dept. of Chem. Engg., IIT,

Kharagpur; Prof. Dr. A. K. Bhatanagar; Emeritus Prof. Dept. of Chem. Engg, IIT, New Delhi; Shri V. S. Verma, CEA, Ex-Officio Addl. Secretary to GOI; Mr. A. Kalam, CMD, ECL, Sactoria; Shri M. C. Nebnani, GM, NTPC, Noida; Shri R. K. Sachdev, President CPSI and Former Advisor, MOC, GOI; Prof. S. P. Mehrotra, Director, NML, Jamshedpur; Shri K. P. Verma, Advisor (Projects), MOC, GOI, New Delhi, Dr. M. O. Garg, Director, IIP, Dehradun; Dr. Kalyan Sen, Director, CFRI, Dhanbad and Dr. N. S. Das, Scientist, CFRI is the Secretary. The first RC meeting was held on 13 March 2004.

Dr K. Sen, Director with RC members on the visit of FCT Pilot Plant

CFRI WEBMAIL STARTED

CFRI web-mail developed by the Computer Section is the recent development for internal mail and file transferring media. Now CFRI is gradually approaching towards a paperless office. This web-mail is very user-friendly and needs simple knowledge to execute the process.

REPUBLIC DAY CELEBRATION

Fifty-fifth republic day was celebrated with hoisting of tricolour by Shri P.K Bandopadhyay, Scientist 'G' on 26th January 2004. Shri Bandopadhyay addressed the staff members, security guard and school children on this occasion. Sweets were also distributed to the children.

NATIONAL SCIENCE DAY

National Science Day was celebrated on 28 Feb. 2004. On this occasion, Dr. Ashish Sarkar, Assistant Professor, Deptt of Applied Chemistry, Indian School of Mines, Dhanbad was the Chief Guest. He delivered National Science Day Lecture on "FLYASH**:** Waste or Wealth". In his lecture, he described various uses of fly ash. Dr P. Samuel, Scientist "F" in his welcome address, highlighted the valuable research done by Sir C.V. Raman, which led to 'Raman Effect'. Dr Abhijit Sarkar, Scientist threw light on the importance of National Science Day and also apprised about the agenda and activities of 'Year of Scientific Awareness–2004' declared by Govt of India. He also discussed about the constitution of Committee in Jharkhand for conduction of the programme under this banner. Shri Ramashish Singh, Scientist proposed a hearty vote of thanks and called attention to the keen interest taken by Dr Kalyan Sen, Director, CFRI for meaningful research on fly ash.

DEPUTATION ABROAD

Dr Kalyan Sen, Director, CFRI and Shri S.K.Kabiraj, Scientist, Coal Preparation visited UK during 8-10 March 2004 to inspect a coal washery at Gascoigne Wood (which is under disposal). M/s. Arun Coke Private Ltd., Dhanbad is interested in its purchase and installation of the said washery in India and requested CFRI Dhanbad to negotiation for the same.

TRAINING ON COAL CARBONIZATIION

A training programme for the Chemists and Engineers of Durgapur Projects Limited, (Coke-Oven Plant) was organized from 22nd to 26th March 2004. This programme included training on various aspects of coal carbonization. In this five days programme, 25 numbers of CFRI staff took part actively and imparted training to the participants.

BOOK EXHIBITION

A book exhibition was organized in CFRI from 10-12 March 2004, in which, 4 publishers from Dhanbad, Ranchi and Delhi participated vigorously. This exhibition covered different books on various aspects of science and technology including the concomitant aspects of ongoing R & D activities of CFRI. Besides, books in Hindi on various subjects were displayed for the visitors of the Exhibition. As an outcome of the exhibition, purchase order for procurement of 178 books covering different areas like science, fuel cell, environment, management, information technology, tribals of India including some books on Hindi Language has been placed to the concerned publishers.

TRAINING ON IMPROVED CHULLAH

CFRI has developed two improved chullahs namely 'Angar Bandhu and Angar Mitra'. A five day training programme covering lectures, practical

training and demonstration was organized from 15 to19 March 2004 for the participants from various districts of Jharkhand under the aegis of Jharkhand Renewable Energy Development Agency (JREDA), Ranchi. The purpose of the programme was to generate self employment for rural people through awareness. Shri R. C. Prasad, Director, JREDA was the Chief Guest on the valedictory function.

PATENT INFORMATION: COAL AND ITS UTILIZATION

US Patent Application No. 20030164119 Dated September 4, 2003
Title: Additive for dewaterable slurry and slurry incorporating same
Inventors: Naji, Basil (Toongabbie, AU; O'Chee, Milton; *US)*
Abstract: A cementitious slurry comprising fly ash having a predominant particle size of up to about 10 microns, and/or aluminous material with a predominant particle size of up to about 150 microns and an additive as a water reduction agent can replace either wholly or partially a conventional plasticizer *(Source-www.uspto.gov)*

WORLD AROUND

CRUDE WORLD - THE MANY LITTLE BLACK DEED S OF OIL

- Largest (95 per cent) dependence of the world's transportation on oil fuel.
- Oil, earlier considered as a major resource to make Nigeria one of the wealthiest countries, made it one of the poorest.
- Biggest consumption of oil by Industrial nations resulting in disproportionate fall in the oil consumption by developing nations.
- Dominance of only 38 'super-giant' fields crude oil reserves over about 40,000 oil fields in the world.
- Consumption of 30 percent of oil by USA-a producer of hardly three per cent oil.
- Contribution of 35 billion tons of carbon dioxide and 12 million tons of methane by Gas burning to global warming annually.
- Large scale oil spillage (over 10 million gallons almost every year) since 1960s (In 1999, about 32 million gallons of oil spillage worldwide into marine and inland environs as a result of 257 oil transportation accidents).
- Of the 3.2 million tons of estimated oil mucking oceans up each year, oil refineries and transport efforts account for about 46 per cent.
- Location of refineries in the US mostly near African-American and Native American populations.
- Fifty three per cent female petrochemical workers in total 700 refineries, exposed to organic solvents, likely to suffer from prolonged menstrual cycles *(Source: Down To Earth-Jan 31, 2003).*

CFRI IN MEDIA

1. Advisor, S&T arrived at CFRI *(Dainik Jagran 03.02.04).*
2. National Science Day celebrated *(Dainik Jagaran 29.02.04; Hindustan and Prabhat Khabar 01.03.04).*
3. True knowledge from book only - C.K. Das *(Hindustan 11.03.04; Prabhat Khabar 15.03.04).*
4. CFRI conducting researches to improve coal quality *(Hindustan Times 16.01.04).*
5. CFRI projects seek devp of PFBC for high ash coal *(Hindustan Times 19.01.04).*
6. CPYLS programme organized at CFRI *(Hindustan, Hindustan Times, Dainik Jagaran 15.01.04; Aaj and Prabhat Khabar 18.01.04).*
7. Dr Kalyan Sen: An interview with Hindustan *(Hindustan 05.01.04).*
8. CFRI Annual Report 2002-03 released *(Prabhat Khabar 17.01.04.)*
9. CFRI shares environment concerns too *(Hindustan Times 22.01.04).*
10. MoU signed between ONGC & CFRI *(Hindustan 28.01.04).*
11. Progress by dedication to humanity - Dr Sen *(Dainik Jagaran 16.03.04).*
12. Training begins on Improved Chullah at CFRI *(Dainik Jagaran and Prabhat Khabar 16.03.04).*

EVENTS AHEAD

1. CFRI Foundation Day on 22 April 2004.

2. National Technology Day on 11 May 2004.

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