

corded December 2007. See: [http://www.youtube.com/view\\_play\\_list?p=3B79262131CA1BCE](http://www.youtube.com/view_play_list?p=3B79262131CA1BCE).] Storms points out that LENRs seem to be occurring in special localized sites on the surface of deuterium-loaded materials, which he has characterized as constituting a novel 'nuclear active environment' (NAE). The LENR community is currently involved with unravelling the unique nature of the NAE.

M. Srinivasan, who was also involved in cold fusion research from day one at BARC, reviewed the experimental evidence published even prior to the Fleischmann-Pons announcement of 1989, which indicates that LENR is in fact not a new concept and that elemental transmutation seems to be occurring in nature more commonly than generally believed. The pre-cold fusion era transmutation reports are found to be in full consonance with the observations of nuclear transmutation reactions involving the host metal atoms reported by a large number of LENR

workers in recent years. (The BARC cold fusion results of 1989–90, played a key historic role in the early development of the field, by providing a positive picture at a time when doubts were being cast on the reality of the nuclear origin of the phenomenon. The website [www.lenr.org](http://www.lenr.org) carries a brief account of the early BARC work. Unfortunately, interest in the subject died at BARC in the nineties.)

It thus appears that the field of LENR/CMNS has matured sufficiently to claim recognition as a valid new branch of science, even though some of the questions raised in the early years still remain. If all that is claimed by the LENR community is validated, then one has to concede that we are witnessing a significant paradigm shift in nuclear science. It is therefore timely that the Indian scientific community took stock of the status of the field with an open mind, in view of its importance and the prospects of being developed into a 'third alternative option' for generating nuclear energy in the

21st century, besides fission and thermonuclear fusion.

The meeting concluded with a stimulating panel discussion in which the panelists M. R. Srinivasan (former Chairman, Atomic Energy Commission), S. K. Rangarajan (former Director, Central Electro-Chemical Research Institute, Karaikudi), Bikas Sinha (Director, Variable Energy Cyclotron Centre, Kolkata), besides the three speakers unanimously endorsed the view that LENR research should be strongly supported in the country. To quote M. R. Srinivasan '*...There is some science here that needs to be understood. We should set some people to investigate these experiments. There is much to be commended for the progress in the work. The neglect should come to an end*'.

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## MEETING REPORT

### BioMalaysia 2007\*

Many countries around the world are showing great interest in biotechnology now than ever before, and Malaysia is no exception to this. In fact, Malaysia's aim to become a regional biotechnology hub is to make sure that the country will get its slice of the lucrative market. Investments by both foreign and local investors in the biotech sector are encouraging and the biotech sector is well on the track to meet its target of contributing 2.5% of the country's gross domestic product (GDP).

BioMalaysia is an annual premier biotech event of Malaysia that brings biotech experts, industry players and all stakeholders together. BioMalaysia 2007

was held recently and the objectives were to provide partnering opportunities for the biotechnology industry to meet and forge relationships, to provide a unique opportunity for biotechnology companies and research institutions to learn from and share their experiences with experts, to be the platform for governmental agencies, regulators and private sectors to exchange views for working towards achieving greater heights in biotechnology development in the region, and to be the platform for recognition of outstanding performance of scientists and researchers in the area of biotechnology. The theme of the conference was 'Innovation for the Quality of Life'.

In the three-day conference, there were two keynote sessions, three plenary sessions, one single-track super session and six concurrent sessions, namely agriculture biotechnology, healthcare biotechnology, industrial biotechnology, finance, growth and strategic challenges. More than 1000 conference participants, 200 companies/

organizations for exhibition and 10,500 participants from over 30 countries participated in this three-day event. Selected papers, which give the flavour of the conference are mentioned here.

In the keynote address, a systematic review of bionanotechnology was presented by Tony Cass (ICL, UK). He highlighted the importance of standardization, miniaturization, acceptability, responsiveness, timeliness of the medicine, increasing healthcare costs, personalizing therapies, nanoscale techniques for DNA analysis, and advances in bionanotechnology and nanomedicine. Cass claimed that the excitement of working at disciplinary interfaces, engagement of biology/engineering/physical sciences, available funding, desire to generate new values (intellectual property (IP), services and products), and insatiable demand for healthcare are the drivers of bionanotechnology. By summarizing initiatives in the countries from European Union (EU), the USA, India, Japan, Korea,

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Taiwan and Singapore in the field of bionanotechnology, Cass highlighted that current biomedicine is well developed at the macro (i.e. surgery) and molecular (i.e. pharmacological) scales. He covered the role of the rapidly growing field of bionanotechnology in the advancement of nanomedicine and in the treatment models of the 21st century, such as more personalization, earlier identification, including propensities, autonomous monitoring, and regenerative strategies. Recently, Malaysia's BiotechCorp has bought the exclusive worldwide license of a nanotechnology platform from a French company. This technology is expected to be exploited for various innovative applications in healthcare, environmental, cosmetic, food and agricultural sectors.

In a plenary talk, L. Augustin (CMI, Cuba) highlighted the importance of innovative ways in the biotech industry and underlined that biotechnology is important because it offers the possibility of manufacturing a diversity of products at a low energy cost and using cheap raw materials and biodegradable wastes. Based on the experience of the Cuban biotechnology industry, he stated that knowledge is the main limiting factor for the development of biotechnology (products). By discussing barriers such as IP, and regulations in manufacturing and marketing of biotech products, Augustin highlighted the importance of the design of institutions as 'closed loop' organizations, which includes R&D, production and marketing; and according to him this type of organizational set-up has been the main lever which allowed Cuban biotechnology to attain its current position. Twenty years of Cuban biotech experience have convinced him that closed-loop organizations, human capital, integration and strong political will is required for success of the biotech industry.

The world population is increasing at an alarming rate and food production must be increased to meet the need of the growing population. H. Kulaveerasingam (SDTC Sdn Bhd, Malaysia) highlighted the fact that global food production should be increased by 50% by the end of the 21st century. He also noted the trends of consumers' demands for wellness products and meat consumption with development and observed that rapid economic growth in China and India is fuelling the demand for commodities.

R. Y. Othman (UM, Malaysia) spoke about the opportunities in plant biotech-

nology for adoption of molecular technologies in the post-genomic era. She highlighted the need for developing comprehensive programmes, and the importance of adoption of a fully integrated systems biology approach to achieve targeted outcomes.

Malaysia is known for its large production and export of palm oil. However, the palm oil industry is exploring possibilities to develop other innovative products from the oil, and palm oil waste such as leaves and palm oil mill effluents. I. K. P. Tan (UM, Malaysia) drew attention to the production of polyhydroxyalkanoates (PHA) using palm oil and palm kernel oil as substrates in fermentation. PHA shows properties that are similar to petrochemical plastics, and can be used in the production of biodegradable plastics. O. M. Lai (UPM, Malaysia) discussed the applications of lipases in the production of palm-based healthful lipids. R. Sambanthamurthi (Malaysian Palm Oil Board (MPOB), Malaysia) provided a concise review on the various projects undertaken by the MPOB, and noted that the use of elite materials in palm oil micropropagation is important and it can help in increasing the palm oil yield up to 30%. She also highlighted the potential of extracting water soluble antioxidants from palm oil fruits, which is currently discarded with palm oil mill effluents. MPOB has developed an innovative process for extraction of antioxidants from palm oil milling process; the palm oil industry can exploit it for nutraceutical, pharmaceutical and cosmetic applications. S. N. A. Abdullah (UPM, Malaysia) highlighted the importance of the use of tissue-specific promoters in palm oil genetic engineering.

L. M. te Giffel (NIZO Food Research BV, The Netherlands) spoke about the opportunities in the production of enzymes and vitamins needed in the food industry, and highlighted the importance of a multidisciplinary innovative approach to go from concepts to products in the food industry. P. Loganathan (DVS, Malaysia) highlighted the shortage of mutton, beef and milk/milk products in Malaysia. He also emphasized the need to cut down import in the food sector by developing resources for food security purpose.

A. Anwar (MGRC Sdn Bhd, Malaysia), in his plenary lecture highlighted the applications of high-throughput, low-cost, second-generation DNA sequencing

technologies in the field of personalized healthcare, agriculture and biotechnology. He hinted that in the post-genomic era everything will develop fast than what one can predict; hence it is difficult to predict beyond the next five years. He noted that the degree of variation in human genome could be from 0.1 to 3% only, irrespective of race or religion, and re-sequencing of whole genomes will accelerate our understanding of disease basis. According to him, managing and analysing terabases of DNA data and correlating diverse data types to develop diagnostics and therapeutics are new challenges ahead.

A. H. Zakri (UNU, Japan) discussed the deficits in the capacity of developing countries to implement the Cartagena Protocol on Biosafety (CPB), to define their biotechnology policies and priorities and to access technologies specific to their local needs. A. S. A. Bakar (Global Satria Sdn Bhd, Malaysia) updated the audience on the current state of the aquaculture industry in Sarawak (Malaysia) and noted that 85% prawn farms has been closed down due to diseases and low profitability. To overcome challenges in the aquaculture industry, especially in prawn farming, he drew attention to innovative ways, such as viral disease control using anti-sense RNA technology, and use of phyto-oestrogens to increase the number of female prawns that grow faster than the males.

Molecular markers, especially DNA markers, play an important role in plant breeding. According to C. K. Aik (Green World Genetics, Sdn Bhd, Malaysia), demand for the food and quality seeds (high yielding) is driven by population growth and scarcity of land respectively. Molecular markers can be used innovatively as a selection tool which provides the potential for increasing efficiency in breeding programmes by improving accuracy, allowing earlier selection, and reducing population size for field testing.

In Malaysia, there is increasing interest in manufacturing products such as yoghurt, fermented sausage, fermented soy products, probiotic lactic drinks, etc. A. M. Yazid (UPM, Malaysia) in his talk mentioned that, at present, Malaysia does not have a starter culture collection centre to support increasing interest in manufacturing of fermented products. According to him, it is high time that Malaysia establishes a national centre for collection,

preservation and distribution of starter cultures.

D. Duche (Centre d'Etude et de Valorisation des Algues, France) presented an overview of innovative ways to use algae for manufacturing various consumer products. There are about 30,000 species of algae that live in water and these algal members have tremendous potential, which can be exploited in agriculture, animal and human nutrition, and in bio-energy production. According to him, for bio-diesel production from algae, the target price should be \$ 0.5/l to compete economically against petro-diesel. C. Callenbach (Ingrepro B.V., The Netherlands) dealt with various algal products and the market needs. He observed that Malaysia is the right place to invest in manufacturing of algae-based products, because the country offers excellent business opportunities for agro-biotech industries, in addition to good infrastructure and business climate. Both Callenbach and Duche, while talking on bio-diesel production from algae, showed that innovative R&D (genetic engineering of algae), selection of a suitable algal species, and optimization of the extraction process/methods can bring down the cost of bio-diesel production from algae. According to them, about 50,000 l/hectare/year bio-diesels production is possible from algae.

S. L. Croft (LSH&TM, UK) discussed the importance of public-private partnership in developing products for disease control. A. Fournet (IRD, Laboratoire de Pharmacognosie, France) deliberated on the innovative ways of isolation of quinolines from *Galipea longiflora*, which have shown promising activity against several parasite infections. H. Ui (KU, Japan) highlighted the invention of a novel compound, nafuredin, from *Aspergillus niger* FT-0554. This compound inhibits the helminth complex I selectively, and shows anthelmintic activity *in vivo*. R. J. Quinn (Griffith University, Australia)

in his presentation claimed that his team has established a strategy to screen drug-like or lead-like fractions, and this strategy could be instrumental in developing high-throughput screening strategies for natural substances. M. J. Drysdale (Vernalis (R&D) Ltd, UK) presented trends in the treatment of cancer. According to him, combination therapies are the way forward for cancer treatment. S. Totey (Stempeutics Research Pvt Ltd, India) presented the promises and challenges in developing stem-cell therapies in Malaysia, where the overall stem cell market is USD 150 million. T. P. Castor (Aphios Corporation, USA) noted that more than 50% of the pharmaceuticals approved by various regulatory bodies has originated in nature. Aphios has developed cost-effective technology platforms to speed up the discovery of nutraceuticals and pharmaceuticals.

Rainforests are considered the world's largest pharmacy and innumerable herbal and pharmaceutical remedies remain to be discovered. Malaysia's diversity is ranked 12th and 4th in the world and Asia respectively. R. Manickavasagar (Alterni, Hollista Biotech Group, Malaysia) presented a comprehensive overview of strategies in developing sustainable natural products industry in Malaysia. He noted that 99.5% of the natural resources are not utilized. Funding holds the key in the biotech business. Venture capital (VC) can pump in funds by understanding the risk of loss and the potential for profit. A. Alias (MTDC, Malaysia) hinted that we need to be aware of the VC concept of funding. Not all biotech companies are suitable for VC funding. VC interests are aligned with the entrepreneurs, and cannot satisfy everyone. Also, more VC is needed in Malaysia.

By understanding the importance of biotechnology as one of the key drivers of the country's development, the Malaysian Government is fully committed to

the advancement of the biotech industry in the country. To bolster this commitment, Y. B. Dato' Sri Dr. Jamaludin Jarjis, Minister of Science, Technology and Innovation presented a talk about 'Market and technology-driven innovation model for wealth creation and societal well being', highlighting the opportunities available in the Malaysian biotech industry. Malaysia's national biotech policy was announced in 2005, and the first phase (capacity building) of it will be completed in 2010.

Other speakers presented different aspects of agriculture, healthcare and industrial biotechnology, strategic challenges of the biotechnology industry, and financial needs and growth of the biotech industry. The biotech industry is growing rapidly and each country in the world has to compete in an increasingly borderless world; the real advantage lies with countries that have lower costs of production. For instance, lower costs of production/manufacturing in India and China put them in a better position and help directly or indirectly in their economic growth. Biotechnology appears to be the future lifeline in Malaysia. Nonetheless, in order to remain competitive, innovation is required now more than ever before in the history of the biotech industry.

All the papers were well presented in the conference and there was good scientific interaction and discussions. On the whole it was a successful international conference and the organizers, supporting agencies, and their team of dedicated individuals deserve appreciation for organizing this event.

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