



S&T Newsletter



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Centre for Science and Technology of the Non-Aligned
and Other Developing Countries (NAM S&T Centre)

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From the Dg'S Desk

Warmest greetings to our esteemed readers!!



Our member country Zimbabwe hosted for the first time an international event organised by the NAM S&T Centre. This highly successful workshop titled 'Mineral Processing and Beneficiation' held in Harare, Zimbabwe during 11-14 September 2014 jointly with the Ministry of Higher & Tertiary Education, Science & Technology Development (MoHTESTD) and the Ministry of Mines and Mining Development of Zimbabwe was inaugurated by H.E. Robert G. Mugabe, Honorable President and Head of State and Government of the Republic of Zimbabwe. 110 scientists, engineers and minerals experts from 15 countries attended this scientific event, which concluded with the unanimous adoption of the 'Harare Resolutions on Minerals Processing and Beneficiation'.

The First Meeting of the Bureau of the Thirteenth Governing Council (GC) of the NAM S&T Centre was also held in Harare, Zimbabwe during 8-9 September 2014. The Bureau Meeting was inaugurated by H.E. Dr. Olivia N. Muchena (MP), Minister for MoHTESTD and was chaired by Mr. Daan du Toit, representing South Africa as the President of the 13th Session of the GC.

Like previous two years, the Centre is continuing to implement the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme for this year too. Consent has been received by us from a large number of Indian S&T institutions for affiliating the selected candidates with them for undertaking research work.

In the last quarter the Centre brought out its latest publication - 'Industrial Biotechnology in Non-Aligned and Other Developing Countries Current Status and Future Prospects', edited by Prof. Abdelfattah Badr (Egypt) and Dr. Maranda Esterhuizen-Londt (South Africa).

The Centre has announced holding an International Workshop on 'Science, Technology & Innovation Policy Making for Developing Countries' in Kish Island, Iran during 28th November - 1st December 2014. Concerned professionals desirous of participating and sharing knowledge in this highly topical subject may send us their nominations by the last date, 24th October 2014.

Please be on the look out for our announcements on some more exciting programmes in the near future.

Happy Reading!


(Arun P. Kulshreshtha)

1st Bureau of 13th Governing Council (GC) of the NAM S&T Centre Meets at Harare, Zimbabwe on 8-9 September 2014

The 1st meeting of the Bureau of 13th Governing Council (GC) of the Centre for Science and Technology of the Non-Aligned and other Developing Countries (NAM S&T Centre) was held in Harare, Zimbabwe on 8th and 9th September 2014, which was attended by 8 delegates from 4 member countries and 3 representatives of the NAM S&T Centre including its Director.



Inauguration of 1st Bureau Meeting of 13th GC

(Contd. on page 2 col. 1)

Centre Organised

3rd International Workshop on Mineral Processing and Beneficiation Harare (Zimbabwe), 11-14 September 2014

Minerals processing and beneficiation is an area of immense potential and growth for all the nations worldwide, especially those which are endowed with nature's blessings in the form of abundant mineral resources. The mining industry has also been crucial to the economic development in both historical and contemporary terms and the mining sector is both a major employer and a major contributor to the export revenues. Unfortunately, these resources are not fully exploited in developing countries due to the lack of advanced skills, modern and innovative research and technology and the new world trade regime. Many



Inauguration of the Mineral Processing and Beneficiation Workshop

(Contd. on page 5)



(Contd. from Page 1 - Bureau Meeting, Harare, Zimbabwe)

2. During the Ceremonial Opening and Inaugural Session Dr. Washington T. Mbizvo, Permanent Secretary, Ministry of Higher and Tertiary Education, Science and Technology Development of the Republic of Zimbabwe welcomed the Bureau members and those present in the audience and offered all support for the successful organisation of the Bureau meeting.

In his Opening Remarks, Mr. Daan du Toit, President of the 13th Session of the Governing Council of the NAM S&T Centre and Deputy Director-General, International Cooperation and Resources, Department of Science & Technology (DST), Government of South Africa extended his greetings to the participants and expressed his appreciation to the Ministry of Higher and Tertiary Education, Science and Technology Development for consenting to host this meeting on behalf of the Government of Zimbabwe. He said that South Africa would like to establish collaborative relationships with other member countries in the African Region and also with India and Malaysia in various important areas and expressed that the NAM S&T Centre can play a very important role in this regard.

Mrs. Sadhana Relia, Scientist G & Head, International Multilateral and Regional Cooperation Division, Department of Science and Technology (DST), Government of the Republic of India (who represented Prof. K. VijayRaghavan, Vice-President of the 13th GC and Secretary to the Government of India in DST), thanked the Government of Zimbabwe for hosting the Bureau meeting in the year 2014 that marks 25th Silver Jubilee Anniversary of the NAM S&T Centre. She recapitulated India's contribution in reinvigorating the financial resources of NAM S&T Centre which has served an inspirational and enabling effect on expanding NAM S&T Centre's scope and scale of international scientific activities and thereby their sphere of influence in South-South cooperation and collective self reliance amongst developing countries. She reflected on India's overall appreciation for NAM S&T Centre's identity and impact befitting its international stature and its intervention that found attention,

expression and positive recognition in the Declaration of 16th NAM Summit (2012) for South-South cooperation being pursued by NAM S&T Centre.

Dato' Dr. Mohd. Azhar bin Yahya, Vice-President of the 13th GC and Deputy Secretary General, Ministry of Science, Technology and Innovation, Malaysia in his remarks mentioned that ever since Malaysia became a member of the NAM S&T Centre in 1994, the country has been an active collaborator and participant in the activities organised by the Centre. He added that the year 2014 has been declared by the Malaysian Ministry of Science, Technology and Innovation as the Year of Commercialisation with the aim of commercialising 60 R&D products this year. He also congratulated the Centre for its outstanding achievements thus far and also pledged Malaysia's continued support in the coming years.

Prof. Dr. Arun Kulshreshtha, Director, NAM S&T Centre made a presentation on the objectives and functions of the NAM S&T Centre and its role in developing partnerships and promoting South-South and North-South cooperation through Science & Technology. The graphical representations made by him showed the trends in utilising the limited financial resources available with the Centre. It was clearly illustrated that in last ten years, the expenditure made by the Centre on scientific activities was considerably more as compared to the administrative expenditure, which has been achieved only due to excellent partnership arrangements, improved management practices and self-imposed cost cutting on avoidable expenditure.

Three latest books published by the NAM S&T Centre were also released in the Ceremonial Opening.

3. The Ceremonial Opening was inaugurated by Her Excellency Dr. Olivia N. Muchena (MP), Honourable Minister for Higher and Tertiary Education, Science and Technology Development of Zimbabwe. In her address the Minister acknowledged the leadership of South Africa in steering the NAM S&T Centre during its tenure as President since 2013. She appreciated the utilisation of



Group photo of Participants of 1st Bureau Meeting of 13th GC



(Contd. from Page 2 - Bureau Meeting, Harare, Zimbabwe)



Working Meeting of 1st Bureau of 13th GC

resources by the Centre and mentioned that Zimbabwe as the Founder Member of the Centre is fully committed to ensure its progress. She recognised that ever since its inception, there has been a steady growth in the membership of the Centre and even the non-member states have been taking keen interest in partnering with the Centre in sharing of knowledge and experience through its programmes on emerging and developmental matters such as sustainable energy, role of women, science diplomacy, etc. The Minister congratulated the Centre and the Bureau for the outstanding achievements of the Centre for socio-economic development of its member states and offered the continued support of her government for the furtherance of its programmes. She laid emphasis on the role of the Centre to continue to search opportunities in science and technology and effectively exploit the growing economies sustainably.

4. During the Working Meeting, the President of the 13th Session of the GC, Mr. Daan du Toit, emphasised the need to induct other countries as new members of the Centre and suggested that all the Bureau Members should try to sensitise the non-member countries during their visits abroad explaining the benefits of becoming members of the Centre. The Bureau members took note that the GC in its 13th Meeting held at Sandton City, South Africa on 2-3 September 2013 had decided in favour of minor amendments in the Statute of the NAM S&T Centre that was adopted on 4th February 1985. In compliance thereof, after having completed various formalities of referring a draft to all the GC Members, the Bureau adopted the amended Statute to come into force with immediate effect.

The Bureau also noted the overall achievements of the Centre since its inception and various scientific activities undertaken and publications brought out during the period after the last GC meeting in September 2013. Besides this, the Bureau appreciated the efforts put in the Centre in implementing various Fellowship schemes, including the good progress made in the successful execution of the 'Research Training Fellowship for Developing Country Scientists (RTF-DCS)' scheme which was a fitting example of South-South cooperation. In this connection, the Bureau thanked the Department of Science and Technology of the Government of India for its support for this Fellowship scheme and requested that the number of these fellowships should be appropriately increased considering the great interest among the scientists in developing countries to avail this opportunity to carry out research work in the Indian institutions.

The Bureau expressed happiness that the Centre has earned a very good reputation over the years because of its high quality scientific activities and congratulated the Centre for keeping the administrative expenditure stable while significantly increasing the expenditure on scientific activities over the years.

The Bureau unanimously acknowledged the leadership of Prof. Arun P. Kulshreshtha and the dynamism rendered by him in building momentum, steady accomplishments, visibility and sustaining international recognition for NAM S&T Centre's South-South cooperation driven scientific collaborative actions with prudent management of limited funds at its disposal.

Distinguished Visitors To The Centre

19th Aug 2014	Dr. Markandey Rai , Special Youth Advisor, UN-Habitat and Executive Director, Synergies Institute, Accra, Ghana and Dr. P.S. Rana , Chairman, Construction Industry Development Council, India
24th Sep 2014	Dr. Hassan Mshinda , Director General, Tanzania Commission for Science and Technology.



H.E. ROBERT G. MUGABE, HONOURABLE PRESIDENT OF ZIMBABWE INAUGURATES CENTRE'S WORKSHOP ON MINERALS PROCESSING AND BENEFICIATION IN HARARE



Prof. Arun Kulshreshtha, Director, NAM S&T Centre with H.E. Robert G. Mugabe, President of the Republic of Zimbabwe

The 3rd International Workshop on 'Mineral Processing and Beneficiation' organised by the Centre in Harare, Zimbabwe was inaugurated by H.E. Robert G. Mugabe, Honorable President and Head of State and Government of the Republic of Zimbabwe on 11th September 2014 in a glittering ceremony before the gathering of Zimbabwean Ministers, Members of Parliament, Senior Government Officials, Mineral Experts and Professionals, Faculty Members and students.

In his address, President Mugabe while describing the historical background of the Non-Aligned Movement (NAM) fondly remembered his personal association with the former Indian Prime Ministers, Indira Gandhi and Rajiv Gandhi, former Malaysian Prime Minister Dr. Mahathir bin Mohamad, former President of Ghana Kwame Nkrumah and other world leaders and mentioned that the NAM had played a vital role in the global political scenario in bringing peace under the backdrop of the Cold War between the USA and the Soviet Union. He said that it was worrying that the importance of the NAM has diminished politically at the moment and emphasized that the unity

among the NAM member countries should form the basis to contain the present day economic dominance of the USA and the European Union across the globe. He desired that the NAM countries should join together through trade and value addition to their natural resources and transform the movement into an economic power house.

President Mugabe noted that the desire of the founding members of the Non-Aligned Movement for the exchange of information, trade and statistics was realised through the establishment of the South-South Centre in Geneva and added that the setting up of the NAM S&T Centre was another initiative in this direction. He commended the NAM S&T Centre for coming out with a platform for the exchange of information and expertise in Science and Technology in the spirit of South-South Cooperation. He further complimented the Centre for taking up such an appropriate subject like Minerals Processing and Beneficiation which is of prime importance to the NAM Countries, particularly the African nations. He observed that the developing countries have so far been engaged in Minerals exploration and extraction and exporting the same as raw materials and hoped that the workshop would be able to address the need for the flow of knowledge and understanding the best practices in beneficiation and value addition of such resources.

The President also launched a journal on Minerals Beneficiation and Value Addition.

H.E. ROBERT G. MUGABE, HONOURABLE PRESIDENT OF ZIMBABWE OFFERS TO HOST NAM S&T CENTRE OF EXCELLENCE ON MINERALS PROCESSING AND BENEFICIATION

During the inauguration of the Centre's International Workshop on Minerals Processing and Beneficiation in Harare on 11th September 2014, H.E. Robert G. Mugabe, the Honorable President and Head of State and Government of the Republic of Zimbabwe offered to host a Non-Aligned Movement Science & Technology Centre of Excellence on Minerals Processing and Beneficiation in Zimbabwe to realize the potential of the mineral resources and its contribution in industrial development for the benefit of the member states. As the first step towards the implementation of the above, the Government of Zimbabwe has already constituted a Task Force for preparing the policy guidelines and regulatory frameworks for the establishment of minerals market places and commodity exchange mechanisms. The Zimbabwean Government has sought active association of the NAM S&T Centre in the process of the establishment of the Centre.



(Contd. from Page 1 - Mineral Workshop, Harare, Zimbabwe)



Group photo during Inauguration of the Mineral Processing and Beneficiation Workshop

minerals are still exported as ores, concentrates or metals, without significant downstream processing or value addition. Therefore there is an urgent need for the policy makers, scientists, technologists, academics and other industry experts to come together and assess ways and means to address the aforementioned skills gap.

2. The Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) had earlier organised two international programmes on Minerals, the first one being the International workshop on 'Mineral Resources and Development' in July 2004 at Kerman, Iran in association with Shahid Bahonar University of Kerman. The second one was the International Workshop on 'Minerals Processing and Beneficiation' organised in September 2012 in Johannesburg, South Africa jointly with the Department of Science and Technology of South Africa, which got concluded with the adoption of a Resolution having a number of significant recommendations for various countries and stakeholders. It also strongly urged to hold similar scientific programmes in other developing countries for strengthening and promoting the relations among various

countries on Minerals Processing and Beneficiation

3. As a follow up, the NAM S&T Centre organised its **3rd International Workshop on 'Mineral Processing and Beneficiation'** at Harare, Zimbabwe during 11-14 September 2014 jointly with the Ministry of Higher and Tertiary Education, Science and Technology Development and the Ministry of Mines and Mining Development of the Republic of Zimbabwe for brainstorming by international policy makers, scientists and technologists, mining industry executives, mineral industry and technology producers, investors, exploration people, mine owners and traders, planners and decision-makers.

4. The Workshop was inaugurated by H.E. Dr. Robert G. Mugabe, the Honourable President and Head of State and Government of the Republic of Zimbabwe on 11th September 2014 in a glittering ceremony before the gathering of over 1000 persons, including the foreign delegates and Zimbabwean Ministers, Members of Parliament, senior government officials, mineral experts and professionals, faculty members and students.



Foreign Participants of Mineral Processing and Beneficiation Workshop



(Contd. from Page 5 - Mineral Workshop, Harare, Zimbabwe)



After the welcome remarks by Dr. W T Mbizvo, Permanent Secretary, Ministry of Higher & Tertiary Education, Science and Technology Development (MoHTESTD), Zimbabwe, Prof. Dr. Arun Kulshreshtha, Director, NAM S&T Centre in his remarks mentioned that this important event was being held in Zimbabwe during the 25th Anniversary Year of the Centre and expressed gratitude to the Honourable President of the Republic of Zimbabwe for gracing this occasion

H.E. Dr. O.N. Muchena, MP and Honourable Minister of MoHTESTD, Zimbabwe in her remarks welcomed the Honourable President Mugabe and thanked the NAM S&T Centre for bestowing the honour to Zimbabwe to host the important workshop with wide range of papers for the benefits of developing countries through S&T including human capacity building in Minerals Processing and Beneficiation. She mentioned that the Science, Technology and innovation Policy of Zimbabwe was launched in 2012 with six primary goals, one of these being South-South Cooperation. She then introduced the Honourable President Mugabe to the audience. This was followed by short remarks by H.E. Dr. Chidakwa, MP and Honourable Minister of Mines and Minerals Development, Zimbabwe. The Deputy Minister of MHTESTD, Dr. G. Gandawa, MP handed over the First Award of 'The Scientist of the Year 2014' to President Mugabe for his outstanding contribution to Education and Science and Technology.

The Honourable President Mugabe after his speech declared open the International Workshop.

5. The Workshop was attended by 110 participants from 15 countries, including Afghanistan, Guyana, Indonesia, Iran, Malaysia, Mauritius, Myanmar, Nigeria, South Africa, Sri Lanka, Tanzania, Uganda, Vietnam, Zambia and Zimbabwe of which 89 delegates were from the host country Zimbabwe. The organising team comprised 3 representatives from the NAM S&T Centre and several officials from the host country, most of who also actively joined the workshop deliberations.

The overseas participants were from Afghanistan [Mr. Popal Faizi, Head of Minerals Team, Ministry of Mines]; Guyana [Ms. Dianne A McDonald, Snr. Mineral Processing Engineer II, Head- Mineral Processing Unit of Guyana Geology & Mines Commission]; Indonesia [Mr. Yohannes Yudi Prabangkara, Director, Centre for Mineral Resources Technology, The Agency for the Assessment and Application Technology

(BPPT)]; Iran [Engr. Mr. Morteza Rastegaran, Representative of CITC in Harare and Attaché (Science & Technology) of the Embassy of I.R. of Iran in Harare]; Malaysia [Mr. Malek Selamat, Senior Research Officer, Mineral Research Centre, Minerals and Geoscience Department]; Mauritius [Dr. Goodary Rajeshwar, Dean and Head, Faculty of Sustainable Development and Engineering. Head of Geotechnical Laboratory/Lecturer - Soil Mechanics, Université des Mascareignes (Ex-IST)]; Myanmar [Mr. Khin Maung Htwe, Associate Professor, Head of Department (Mining Engineering), Technological University (Taunggyi), Ministry of Science and Technology]; Nigeria [Mr. Olusegun Adewole, Deputy Director, Raw Materials Research and Development Council, (Federal Ministry of Science and Technology)]; South Africa [Ms. Mohale Setepane, Chief Director: Mineral Promotion and International Coordination, Department of Mineral Resources] and [Mr. Tony Nyakudarika, Principal Process Engineer, DRA Projects (Pty) Ltd, South Africa] and [Mr. Brighton Gwavava, Managing Director, Suntech Geometallurgical Laboratories] and Mr. Joel Mungoshi, Director and Principal Consultant, Manhize Projects]; Tanzania [Ms. Tabitha Geoffrey Etutu, Department of Science and Technology, Ministry of Communication, Science and Technology]; Uganda [Mr. Richard Tushemereirwe, Senior Presidential Advisor for Science, State House]; Vietnam [Mrs. Vu Anh Thu, Lecturer, Department of Geology, Faculty of Geology, Hanoi University of Mining-Geology]; Zambia [Dr. Lordwell K. Witika, Department of Metallurgy and Mineral processing, School of Mines, University of Zambia]; Zimbabwe [Prof. D. J. Simbi, Vice Chancellor, Chinhoyi University of Technology] and [Mr. Louis Mabiza, General Manager- Processing, Zimplats] and [Prof. C.C. Maponga, Technical Director- Nanotechnology, Ministry of Higher and Tertiary Education, Science and Technology Development] and [Dr. Elias Matinde, Director-Metallurgical Research, Scientific and Industrial Research and Development Centre (SIRDC)] and [Mr. Rabbson Mpofu, Senior Assistant Commissioner, Officer Commanding Minerals and Border Control Unit].

6. The overall programme of the Workshop was conducted in seven Technical Sessions with three themes titled 'Mineral Policies and Strategies in Developing Countries', 'Mineral Resources in Developing Countries' and 'Technology Development in Mineral Processing and Beneficiation', which were respectively co-chaired by Mr. Malek Selamat (Malaysia), Mr. Dedimuni Sajjaha De Silva (Sri Lanka), Dr. Lordwell K. Witika (Zambia), Ms. Tabitha Geoffrey Etutu (Tanzania), Mr. Joel Mangoshi (South Africa), Dr. Goodary Rajeshwar (Mauritius), Mr. Popal Faizi (Afghanistan), Mr. Olusegun Adewole (Nigeria) and Mr. Abel Moseki (South Africa), and Mr. Malcom Mazemo, Mr. Mhandu Takunda and Mr. Itayi Marufu of the host country Zimbabwe.

7. The presentations made by the foreign participants were on 'Mining and Mineral Processing at Afghanistan' by Mr. Popal Faizi of Afghanistan; 'Transitioning from Mercury based Gold Extraction to 'No-Mercury' Methods of Gold Extraction in the Guyana Gold Mining Sector' by Ms. Dianne A McDonald of Guyana; 'Artisanal and Small Scale Gold Mining in Indonesia: Toward Mercury Free Gold Processing' by Mr. Yohannes Yudi Prabangkara of Indonesia; 'Mining Capacities in the Islamic Republic of Iran' by Engr. Mr. Morteza Rastegaran of Iran;

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(Contd. from Page 6 - Mineral Workshop, Harare, Zimbabwe)



Group photo at Zimbabwe Diamond Technology Centre, Harare

'The Potential of Natural Malaysian Silica Sand to produce Leucite Glass-ceramics Suitable for Restorative Dental Applications' by Mr. Malek Selamat of Malaysia; 'Minerals and Mineralogy in Mauritius' by Dr. Goodary Rajeshwar of Mauritius; 'Utilization of Mineral Resources in Myanmar' by Mr. Khin Maung Htwe of Myanmar; 'Industrial Gap and the Mineral Industry in Nigeria' by Mr. Olusegun Adewole of Nigeria; 'Mineral Policy Framework Beneficiation and Emerging Global Trends of Concern' by Ms. Mohale Setepane and 'Zimbabwe and the Platinum Group Metals (PGM) Value Chain' by Mr. Tony Nyakudarika and 'Recovery of Fine Diamonds by the GWASMF Process' by Mr. Brighton Gwavava and 'Process Options and Economics for the Beneficiation of Refractory Gold Deposits in Zimbabwe' by Mr. Joel Mungoshi of South Africa; 'The Traditional Mineral Processing Methods in Sri Lanka and Future Prospects for Advance Mineral Processing and Beneficiation' by Mr. Dedimuni Sajjaha De Silva of Sri Lanka; 'Gasification of Municipal Solid Wastes in a Downdraft Gasifier: Solving Mining Energy Challenge' by Ms. Tabitha Geoffrey Etutu of Tanzania; 'Developing Market Places and Commodity Exchanges for Minerals' by Mr. Richard Tushemereirwe of Uganda; 'Cost Benefit Analysis of Bauxite Exploitation in Tay Nguyen Area, Vietnam: Lessons for Industrial Mining in Developing Countries?' by Mrs. Vu Anh Thu of Vietnam; 'Fundamental Surface Properties of Carrolite (CoCu_2S_4) and its Flotation Behaviour' by Dr. Lordwell K. Witika of Zambia.

Five presentations were made by the Zimbabwean participants, viz., 'Wealth Creation for Sustainable Development: Towards Addressing the Challenges in Human Capital Development in Minerals Processing and Beneficiation' by Prof. D. J. Simbi; 'PGM beneficiation – Zimbabwe perspective' by Mr. Louis Mabiza; 'Minerals to Nanoparticles: The Role of Nanotechnology in the Beneficiation and Value Addition of Minerals' by Prof. C.C. Mponga; 'Value Addition and Beneficiation: Developing A Capabilities Driven Beneficiation Framework for the Iron and Steel Industry in Zimbabwe' by Dr. Elias Matinde; and 'Zimbabwe Republic Police Minerals and Border Control Unit (MBCU) in the Mining Sector' by Mr. Rabbson Mpfu.

Prof. Arun Kulshreshtha, Director and Executive Head of NAM S&T Centre made a presentation on 'The Role of NAM S&T Centre for South-South Cooperation in Science & Technology' and briefly described the genesis of the workshop and gave a brief background of the NAM S&T Centre and the details of its activities aimed at the promotion of South-South cooperation.

8. Finally, the Concluding Session was co-chaired by Prof. Arun P. Kulshreshtha (NAM S&T Centre) and Mr. Richard Tushemereirwe (Uganda), in which the delegates extensively deliberated and debated on finalising a document titled 'Harare Declaration – 2014 on Mineral Processing and Beneficiation' with a set of recommendations, which was thereafter unanimously adopted by the participants and later presented to H.E. Dr. O.N. Muchena, MP and Honourable Minister of MHTESTD during the official banquet.

9. The Certificates for Participation were distributed by Ms. Rungano Karimanzira, Director, Projects and Technology Transfer, Ministry of Higher and Tertiary Education, Science and Technology Development of Zimbabwe during the Concluding Session to the workshop participants and all those who were involved in the organisation of this excellent initiative. The Workshop concluded with the participants thanking and greatly applauding the efforts made by the Ministry of Higher and Tertiary Education, Science and Technology Development; the Ministry of Mines and Mining Development of the Republic of Zimbabwe; and the NAM S&T Centre in organising such a wonderful and useful Workshop. The local organisers were also thanked for holding this highly successful event and for excellent hospitality and arrangements made for the delegates. It was unanimously hoped that more similar events will be held in future.

10. The organisers arranged a NAM S&T Familiarisation Tour for the foreign delegates who visited the Diamond Training Centre located at Haydon Estates, Mt Hampden at an hour's drive from Harare. Mr. Lovemore Kurotwi, Chairman, Zimbabwe Diamond Technology Centre made a presentation on the Centre and its future plans, and the delegates saw the existing diamond cutting and polishing facilities as well as the new buildings complex of the Centre under construction.



HARARE RESOLUTIONS

ON MINERALS PROCESSING AND BENEFICIATION

WHILE EXPRESSING GRATITUDE to His Excellency the President of the Republic of Zimbabwe, Robert G. Mugabe, for presiding over the official opening ceremony of the 3rd International Workshop on 'Minerals Processing and Beneficiation' on the 11th September 2014, during which he appreciated the Centre for Science and Technology of the Non-aligned and Other Developing Countries (NAM S&T Centre) as a key thrust and a platform for advancing the developmental imperatives of the NAM and Other Developing Countries through cooperation in innovation, trade, beneficiation and value addition of their mineral endowment, and offered to host the proposed Non-aligned Movement Science and Technology Centre of Excellence for Mineral Processing and Beneficiation;

NOTING WITH CONCERN the array of initiatives from/by developed countries aimed at securing unfettered access to raw minerals from developing countries while discouraging the same developing countries' efforts for beneficiation and value addition;

NOTING WITH APPRECIATION the central role and guidance rendered by the Republic of Zimbabwe through the Ministries of Higher and Tertiary Education, Science and Technology Development; and Mines and Mining Development jointly with the NAM S&T Centre in organising and hosting the international workshop;

FURTHER NOTING the contribution of more than 110 participants from 16 NAM and Other Developing Countries; and the presentation of 22 high quality technical papers;

HAVING DELIBERATED on mineral resource endowment, policies, strategies, regulatory frameworks, research, innovation as well as technological interventions in support of mineral processing and beneficiation in developing countries;

RECOGNISING the challenges faced by NAM and Other Developing Countries in mineral development, processing and beneficiation, including issues of environmental sustainability, technology transfer, skills and infrastructure development;

NOTING that actual mineral wealth can be generated by establishment of designated minerals market places and their commodity exchange mechanisms as enablers of value addition, investment, and strengthening the role of developing countries in international trade of their minerals;

WE, THE PARTICIPANTS OF THE WORKSHOP, representing Afghanistan, Guyana, Indonesia, Iran, Malaysia, Mauritius, Myanmar, Nigeria, South Africa, Sri Lanka, Tanzania, Uganda, Vietnam, Zambia and Zimbabwe unanimously resolve to:

- (i) Immediately undertake the process of establishing the Centre of Excellence for Mineral Processing and Beneficiation in Zimbabwe;
- (ii) Establish a taskforce, as part of the above Centre, for preparing draft policy guidelines and legal frameworks for designated mineral market places and commodity exchanges within developing countries to be presented to African Union Council of Ministers responsible for minerals within the context of the African Mining Vision and AU agenda 2063 and subsequently to the AU Heads of State Summit; as well as the NAM Heads of States Summit;
- (iii) Establish new research & development institutes and strengthen the existing ones for capacity building and mobilise adequate funding for mineral processing and beneficiation in NAM and Other Developing Countries;
- (iv) Strengthen collaboration among NAM and Other Developing Countries in the setting up and implementation of sustainable and appropriate Minerals Development, Processing and Beneficiation Policies including regulatory frameworks;
- (v) Promote value addition of mineral resources and resource-based industrialization through the adoption of sustainable and time bound projects and programmes;
- (vi) Encourage public social private partnerships (PSPP) for the development and commercialisation of new and emerging technologies and ensuring the role of entrepreneurs and youth ventures;
- (vii) Promote strategic Human Resource Development in mineral processing and beneficiation and encourage information exchange of scientists and technologists among NAM and Other Developing Countries;
- (viii) Facilitate access to high-tech research infrastructure, and international collaboration among NAM and Other Developing Countries and promote localised uptake of innovative technologies;
- (ix) Strongly recommend that Governments of Developing Countries refrain from engaging foreign Non-state actors including Non-Government Organisations in the governance of their mineral resources.

It was proposed by the delegate of Uganda to host the next international workshop on this theme sometime in 2016 jointly with the NAM S&T Centre, subject to the availability of funds and necessary government approvals. The participants of the workshop expressed gratitude to them for this kind gesture.

THUS, RESOLVED IN HARARE, REPUBLIC OF ZIMBABWE ON THIS DAY, 13th SEPTEMBER 2014.

Participation of Centre's Personnel in Workshops/Seminars/Conferences

11th–14th Sep 2014	Mr. M. Bandyopadhyay , Senior Expert & Administrative Officer and Mr. Pankaj Buttan , Publication Assistant attended the 3 rd International Workshop on 'Mineral Processing and Beneficiation' in Harare, Zimbabwe.
16th Sep 2014	Ms. Parul Sehgal and Ms. Shania Tahir , Research Assistants attended a get together function on the occasion of the Renovation of the office of the Indo-French Centre for the Promotion of Advanced Research (IFCPAR) at Indian Habitat Centre in New Delhi.
23rd Sep 2014	Ms. Parul Sehgal and Ms. Shania Tahir , Research Assistants attended the National Day Function of the Kingdom of Saudi Arabia in the presence of H.E. General V. K. Singh, Minister of State of External Affairs, Government of India and H.E. Dr. Saud Alsaiti, Saudi Arabian Ambassador to India at Hotel Taj Palace in New Delhi.



Research Training Fellowship for Developing Country Scientists (RTF-DCS) 2013-14

Research Project Completion Reports

Nigeria - Project Completion Report of Mr. Oyetunde T. Salawu



Mr. Oyetunde T. Salawu, Department of Biosciences and Biotechnology, Babcock University, Ilishan-Remo, Ogun State, Nigeria was deputed by the NAM S&T Centre to the Product Development Cell, National Institute of Immunology, New Delhi, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2013-2014 for a period from 12th April 2014 - 1st October 2014 to carry out research work on a project titled 'Polymeric Particles Dual Entrapments of Curcumine with Artesunate and Nisin for Improved Antimalarial and Anticancer Therapy' under the supervision of **Dr. Amulya K. Panda**.

Mr. Salawu studied the anticancer and anti-malarial properties of Curcumin and Artesunate. Nisin, an antimicrobial peptide has also been recently shown to cause cell cycle arrest and reduce HNSCC cells proliferation. Despite these agents' potential therapeutic uses, they are commonly faced with problem of short half-life requiring frequent administration. Their extreme instability also results in poor pharmacokinetics, low bioavailability and pharmacological activity. Therefore development of a carrier that can maintain sustained release profile and avoid rapid degradation of the drugs is essential for their effective therapeutic usage. This study thus aimed to develop a polymeric drug delivery system for Curcumin-Artesunate/Curcumin-Nisin dual entrapment that has proper physical properties for improved malarial and cancer therapy.

Nanosized particulates of single and dual entrapment of the drugs were formulated using solvent evaporation from oil-in-water single and double emulsion methods. The drug entrapment efficiency and *in vitro* release was determined. Toxicity of Curcumin and Artesunate single and their dual entrapment with each other was also assessed. The particles size ranged from 251.1-985.1 nm and the low polydispersity index (PDI) values (0.141-0.489) were within acceptable range for good particles distribution. Nisin showed poor entrapment efficiency (8.17 ± 0.23), a common problem associated with proteins and peptides attributable to adsorption and subsequent protein unfolding at the water-oil interfaces. Artesunate on the other hand showed the highest entrapment efficiency (85.4 ± 3.4). There was continual release of entrapped drugs for the 7 experimented days. All formulated particles with the exception of Curcumin particles showed lesser toxicity compared with free drugs.

A simple method of dual entrapment of Curcumin-Artesunate and Curcumin-Nisin with moderate entrapment efficiency and low toxicity has been developed. The formulated nanoparticulate drugs will augment research efforts towards developing malarial and cancer drugs with enhanced delivery and efficacy.

Togo - Project Completion Report of Mr. Kekeli David N'Konou



Mr Kekeli David N'Konou, PhD Student, University of Lomé, Togo was deputed by the NAM S&T Centre to the Karunya University, Coimbatore, Tamil Nadu, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2013-2014 for a period from 4th February to 2nd August 2014 to carry out research work on a project titled 'Study of Nanocrystals Zinc Oxide (ZnO) Doped or Undoped for Photovoltaic Applications' under the supervision of Dr. M. Haris.

The main aim of his research was to prepare Barium doped ZnO thin films and nanoparticles using three different methods such as microwave hydrothermal, sonochemical and precipitation method. The effect of Barium on the structural and optical properties of the ZnO prepared thin films and nanoparticles using X-Ray Diffraction (XRD), Field Emission Scanning Electron Microscopy (SEM/FESEM), Energy Dispersive X-Ray Spectroscopy (EDS),



Photoluminescence (PL), Raman Spectroscopy, Fourier Transform Infrared (FTIR) Spectroscopy and Ultraviolet Visible (UV/VIS) Spectroscopy were investigated. The XRD analysis indicated that all the samples exhibited hexagonal wurtzite structure with a good crystallization observed in all samples of 1at% Ba doped ZnO. All polycrystalline Ba doped ZnO thin films were deposited on glass substrates. The structural studies on Ba doped samples revealed that the predominant orientation are (101), (002) and (001) lattice plane and the position of this orientation shifted toward lower angle during doping. SEM analyzes of doped ZnO showed the change in shape and particle size. It has been noticed from the SEM micrographs that the incorporation of Ba into the lattice affects the morphology. Moreover, there was a good correlation between the values obtained by mathematical calculation from XRD (Debye-Scherrer's equation) studies and the results SEM analysis.

The intensity of photoluminescence (PL) emission of ZnO is found to be augmented for Ba doped samples. Room temperature Raman spectra measurements revealed the presence of additional modes. FTIR spectroscopy also confirmed the standard ZnO profiles. The FTIR results showed the stretching vibration of the Zn-O bond in Ba doped ZnO nanoparticles. Photoluminescence spectra measurement demonstrated that the nanoparticles exhibit a strong near band edge UV emission peak. The band edge is shifted to the lower energy side of the Ba doped ZnO nanoparticles. Raman spectroscopy of pure and doped ZnO showed that impurities fixed the crystal defect and following it improves the optical properties. Analyzing the results of various types of characterizations, it has been assessed that Ba doped ZnO nanoparticles was successfully synthesized.

Vietnam - Project Completion Report of Ms. Vu Anh Thu



Ms Vu Anh Thu, Lecturer at the Department of Geology, Faculty of Geology, Hanoi University of Mining Geology, Vietnam was deputed by the NAM S&T Centre to the Birbal Sahni Institute of Palaeobotany (BSIP), Lucknow, Uttar Pradesh, India as a Fellow under the Research Training Fellowship for Developing Country Scientists (RTF-DCS) scheme 2013-2014 for a period from 28th March 2014 - 19th September 2014 to carry out research work on a project titled 'Advent of Eukaryotes in the Geological history: Evidence from the Semi Group of the Vindhyan Super group in Central India' under the supervision of Dr. Mukund Sharma.

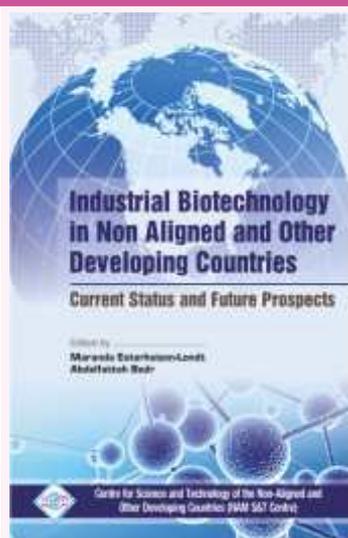
The main objective of her research was to prepare the documentation of microfossils of the Suket Shale, the Semi Group, Madhya Pradesh by investigating the evidence of Eukaryotes in Mesoproterozoic-Neoproterozoic of geological history of the area and to study the statistical analysis of the documented microfossils.

During her research, she observed in terms of age contribution that there are some previous studies which were based on radiometric dates and palaeobiological remain. However, the authors concluded very different ages of the Suket Shale. According to Maithy (1968) Salujha *et al.* (1971), and Maithy and Shukla (1977), the age of this formation ranges from Upper Riphean to Devonian. Based on K/Ar radiometric data, Vinogradov *et al.*, (1964) referred the age of this sediment as 1000 – 1400 Ma. At that time, these researches could not explain the difference between the radiometric date and the age deduced by palaeobiological entities. Rasmussen *et al.* 2002 dated the tuff band and fixed an age of 1599 ± 8 Ma by the U/Pb method. By using to Pb/Pb dating technique, Sarangi *et al.*, 2004 obtained an age of 1599 ± 48 Ma. Recently, Dutta *et al.* 2006 mention the age of Suket Shale as roughly 1600 Ma. The Tirohan Limestone, correlatable unit with the Suket Shale, has been dated by Pb-Pb Isochron as 1650 ± 89 Ma (Bengtson *et al.*, 2009).

The Suket Shale has yielded abundant of microfossils. Their preservation is recorded as single cell, diad and clusters in form. The most abundant forms in this formation are plankton of acritarchs. These microfossils are measured for their size, shape and preservation nature. The cells of microfossils are identified in solitary single cells and also in multiple cells as clusters form. The problems of contamination in Precambrian palaeobiology are also mentioned in acid maceration technique.



New Publication



INDUSTRIAL BIOTECHNOLOGY IN NON-ALIGNED AND OTHER DEVELOPING COUNTRIES CURRENT STATUS AND FUTURE PROSPECTS

Industrial biotechnology involves the application of biotechnology-based tools to traditional industrial processes and the manufacturing of bio-based products in sectors such as chemicals, food and feed, detergents, paper and pulp, textiles, materials and bio-energy from renewable raw materials. The evolution of our ability to manipulate microbial genomes has revolutionised the field of biotechnology and has helped develop new bio-based processes that reduce environmental impacts while improving efficiency in numerous industrial sectors. Industrial biotechnology can help industries become more environmentally sustainable and allows them to develop new manufacturing processes and technologies that are cleaner and more energy efficient.

This publication is a follow up of the First International Winter School on Industrial Biotechnology organised by the NAM S&T Centre jointly with the Science and Technology Development Fund (STDF) of Egypt at Cairo, Egypt during 2-6 December 2012.

The book includes 16 scientific and technical papers from the experts and professionals of 13 countries and presents noteworthy insights on the role of Industrial Biotechnology on providing a more sustainable foundation for the developing world's transition from an agrarian to an industrial economy.

The book is expected to be of great value for the scientists, researchers and professionals who are engaged in this field to seek knowledge on the skills, opportunities, challenges and possible solutions based on the subject and in giving maximum exposure towards the updated research and development that are being conducted in this field across the developing world.

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SCIENCE AND TECHNOLOGY NEWS IN THE DEVELOPING WORLD

Algeria / Malaysia: Cheap, Eco-Friendly Building Bricks

Population growth in many urban areas of the developing world is outstripping available housing and thereby prompting interest in making bricks from cheap and durable local materials. Malaysian scientists at the Tenaga National University have produced prototype bricks using waste from the mining, coal and steel industries. They mixed the materials, including quarry dust, iron oxide that forms on steel during production and ash from furnaces with cement and water. Traditional brick manufacturing uses high pressure or firing in a kiln to shape the bricks. But these scientists formed the bricks within moulds without applying pressure, thus reducing cost and simplifying the brick-making process. Using waste materials rather than clay or shale conserves resources and maintains the soil quality needed for sustainable agriculture development. The new bricks have a variety of promising properties, viz. resistance to corrosion and compression, more durability than traditional bricks in resisting weather-related freezing and thawing, and lower water absorption properties. The use of waste materials for the production of bricks and concrete blocks is an optimal method to solve the problem of storing waste materials and to optimise the cost for the production of building materials.

Elsewhere, Algerian scientists at the University of Kasdi Merbah and the Polytechnic School of Algiers have also developed and produced prototype bricks. These are made from concrete made from **desert** sand, and are strong, providing good heat and sound insulation. The bricks could be produced cheaply in the southern region of Algeria, where Saharan sand is especially plentiful and available at minimal cost. Bricks in Algeria are often stressed by the hot summers and cold winters, and assailed by sandstorms. Therefore if the compression and the thermal resistance of the brick are validated by Algerian building material codes, it could solve the building material crises being suffered by the Algerian builders.

Source: SciDev.Net, 17th July 2014

Brazil: Sensor identifies Insects by Wingbeat Frequency

With funding from FAPESP, the Bill & Melinda Gates Foundation and the Vodafone Americas Foundation, the researchers from the Computational Intelligence Laboratory of the Institute of Mathematical Sciences and Computation (ICMC) at the University of São Paulo (USP), São Carlos Campus, together with colleagues from Bourns College of Engineering at the University of California Riverside (UCR) and the US subsidiary of the Brazilian company, Isca Tecnologias, have developed a sensor that can rapidly, precisely and inexpensively automatically identifies and quantifies several species of flying insects that carry diseases such as dengue fever, malaria and yellow fever. Instead of spraying insecticide over an entire region where a particular species of harmful flying insect or its larvae may be, it can be applied just to areas identified by the sensor as insect foci. Flying insects beat their wings at different speeds, according to their size and other morphological characteristics, and at acoustic frequencies that typically vary between 100 and 1,500 Hertz. This sensor consists of a low-powered laser beam aimed at an array of phototransistors - similar to a laser beam pointed at a wall. As the insect flies between the laser beam and the phototransistor array, its wings partially block the light and cause small variations in it. Oscillations in the light caused by an insect's wings are captured by the phototransistor array. The signals are similar to audio signals, such as those captured by a conventional microphone. The difference is that they are produced not by the variation of the sound waves but by the variation of the light. The signals extracted by the sensor are filtered and amplified through an electronic circuit board. Using a digital sound recorder connected to the board output, it is possible to record the signals in audio files and transfer them to a computer for analysis.

Each species of flying insect produces a slightly different signal. This allows a computational comparison of each of the different species. The data for calibrating and classifying species through the sensor were collected by placing the insects in acrylic boxes containing mounted sensors with controlled lighting, temperature and humidity. Each box with a sensor received dozens of pre-classified flying insects belonging to a single species. These included the mosquitoes *Aedes aegypti* (which transmits dengue and yellow fever), *Anopheles gambiae* (malaria vector), *Culex quinquefasciatus* (lymphatic filariasis vector) and *Culex tarsalis* (Saint Louis encephalitis and western equine encephalitis vector), in addition to the fly *Drosophila melanogaster* (known by its common name 'banana fly'), the fly *Musca domestica*, certain insects belonging to the family Psychodidae (known as drain flies), the beetle *Cotinis mutabilis* and the bee species *Apis mellifera*. After collecting data for 15 days, the researchers recorded the signals generated by the simple passing of the insects through the sensor's laser beam inside the acrylic boxes, deleting any background noise. The signals obtained by the sensors in the various boxes of insects were then mixed and recorded into a single file. When the audio file was analysed by software that included a classification algorithm also developed by the researchers, the computer system was able to differentiate and identify the species of insect with 98–99% accuracy. There are some variables including the time of day at which the insects fly in addition to air temperature, pressure and humidity, the three meteorological factors most affecting the insect activity that may be added to better understand the sensor's success rate in identifying species of insects. The device is able to identify flying insects in real time, using a laser sensor to capture target species, including insects that transmit diseases and agricultural pests. The device also allows non-harmful insects, such as bees and other pollinators or food sources for other animals, to be released back into the environment.

The idea can also be used as an intelligent insect trap. The trap is cylindrical and made of ABS pipe with a laser sensor mounted at its entry point and a collection bag at its exit point, much like a vacuum cleaner. It has a valve at the entry point that releases carbon dioxide, a substance capable of attracting the females of many species of mosquitoes. When flying in front of the trap's entry point, the insect is sucked in by an airflow generated by a fan similar to that found in a computer, which carries it to a chamber containing the laser sensor for classification. If the insect is identified as a non-harmful species, an exit door opens and the insect is pushed out of the trap by an inversion of the airflow. However, if it is identified as a harmful species, the airflow pushes the insect into the collection bag, where it is held by adhesive paper similar to that used in conventional non-selective adhesive traps, those that capture all species of insects, including harmless ones. The trap enables easier and more precise identification and quantification of undesirable insects in a particular area, and monitors the harmful insect population in a particular region in real time and reports this information through wireless networks to health-surveillance agencies.

Source: Agencia FAPESP Newsletter, 30th July 2014

Costa Rica: App designed to report Dengue Breeding Sites

Costa Rican company GeoTecnologías has joined forces with the country's Ministry of Health to develop a Dengue Breeding Report application. The free app allows the public to report mosquito 'hatcheries' to the ministry that in turn will allow the ministry to map this data. The ministry regularly sends workers to find and spray pesticides on hatcheries. But it currently lacks a sophisticated system for recording these visits. This application will allow people to report and georeference their households so as to locate them more easily and attend better to their hatcheries. In the last year alone, Costa Rica has had the highest number of dengue cases in its history, almost 50,000,

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according to the ministry. As a result, it decided to apply its expertise to fight the disease. People are often concerned to see that a possible outbreak is brooding in a local park or in a neighbour's yard that could affect the health of their children and neighbours. But with this app these worries may be prevented by reporting it to the ministry. The app has four sections. The main one enables users to store the precise location - or georeference - of a dengue breeding site along with details such as photographs, the type of hatchery, their name and contact details and when the data were collected. The other sections provide information about dengue prevention, and the respective contact details for the Ministry of Health and GeoTecnologías. The data collected by the app should enable the Ministry of Health to make smarter decisions about deploying resources. For example, the app's tools include 'heat maps' of the places with the greatest number of reported sites. Knowing how many hatcheries there are in each type of setting could also help them know where they must strengthen prevention efforts during the next hatching season. The developers say they plan to modify the app to enable government workers to keep track of which reported sites have been treated and which ones still need to be sprayed.

The app could be expanded to make it possible to report other mosquito-borne diseases such as malaria and chikungunya, and not only in Costa Rica, but around the world.

Source: SciDev.Net, 5th August 2014

Djibouti: New E-campus Platform launched for Francophone Africa

In an effort to provide quality higher education for students in countries on the horn of Africa, the University of Djibouti has launched an e-campus, thus placing it at the forefront of online learning in the region. The establishment of the e-campus will enable Djibouti to expand access to higher education through e-learning and to improve the quality of teaching, learning and research through enhanced use of virtual libraries, open educational resources and virtual knowledge networks. The initiative would also facilitate implementation of bachelor-master-doctorate reform, which many Francophone African countries have undertaken in line with Europe's Bologna process. The University of Djibouti has implemented a sophisticated software system to help it achieve its ambition to deliver tertiary education to students in countries on the horn of Africa. The new e-campus could serve as a model for other Francophone countries and with more than 5,000 students, the university hopes to become an education leader on the horn of Africa. According to the Agence universitaire de la Francophonie, the past decade has seen a proliferation of online and distance learning players in the sub-region, with little mission coordination or institutional collaboration. As e-learning is increasingly viewed as a viable alternative for traditional higher education systems, because of limited indigenous higher education infrastructure several e-initiatives are under way in French-speaking Africa. The recently launched World Francophone e-University uses web communication to provide quality postgraduate education to professionals in the developing world. And there are plans by Senegal for the African University of the Future, which will beam postgraduate courses via satellite from the United States to partner institutions across French-speaking Africa. The Texas International Education Consortium is the lead partner and investor in the project. A well-coordinated e-campus could help in enhancing university access in countries in French-speaking Africa as the vast majority of them do not provide sufficient financial support to sustain large-scale, face-to-face traditional higher education systems. However, poor technological infrastructure, low bandwidth availability and language remain important barriers to online access in most countries in French-speaking Africa.

Source: University World News, 4th July 2014

India: Indian Spacecraft Probe MOM in Mars Orbit

India's first interplanetary probe – an unmanned Mars Orbiter Mission (MOM) spacecraft - was placed in the orbit of the red planet Mars on 24th September 2014. Just two days earlier the US space agency NASA's Mars Atmosphere and Volatile Evolution (MAVEN) mission probe that was launched on 18th November 2013 had also entered into Martian orbit. The MOM spacecraft, also known as 'Mangalyaan' (Hindi for 'Mars Craft') began its 680 million kilometre journey to Mars in November 2013 after getting launched atop India's Polar Satellite Launch Vehicle (PSLV) from Satish Dhawan Space Centre in Sriharikota in southeastern coast of India. MOM established itself into a highly elliptical orbit of 423 km x 80,000 km, with a period of 3.2 days. The spacecraft carries a suite of five scientific instruments and will begin its six month mission, taking measurements of methane gas in the planet's atmosphere and mapping the surface composition and mineralogy. MOM created history by being the first interplanetary mission at a very low cost, \$69 million against MAVEN's \$671 million, which was carried out in a short time of about two years from the original concept to putting it in orbit. With MOM's success, ISRO joins three other space agencies of the US, Russia and Europe who have successfully sent probes to the red planet.

Source: Nature India, 24th September 2014

India: Biocompatible Films for Drug Delivery and Wound Dressing

Researchers from the Department of Chemistry, M.S. University of Baroda, Vadodara and R&D Centre, Gujarat Narmada Valley Fertilizers and Chemicals Company Limited, Bharuch, India have developed biocompatible and biodegradable polyurethane films based on castor oil or polypropylene glycols that have various carbohydrates as crosslinkers. These films could potentially be used in adhesive skin patches for delivering drugs through the skin as dressings for wounds. Polyurethanes are excellent polymers for synthesizing biocompatible drug-delivery systems, except that existing polyurethane-based drug carriers are thermally unstable and show poor mechanical strength. To develop polyurethane-based drug carriers with better mechanical strength, the researchers made them using castor oil or polypropylene glycols and four different carbohydrates as crosslinkers: glucose, sucrose, cellulose and starch. They then prepared films from these polyurethanes and tested their mechanical properties. Films containing glucose and cellulose showed the best elongation properties, whereas films with starch and cellulose exhibited the best tensile properties. The tensile strength and elongation properties of the films reflect their mechanical strength and elasticity, respectively, and those with higher values are resistant to wear and tear, when used in biomedical applications. The researchers exposed the films to normal lung cells and buried them in microbe-containing soil to prove that they were biocompatible, nontoxic and biodegradable. In addition, the films swelled in organic solvents used to dissolve drugs. This suggests that drug molecules can be bound to the films by immersing the films in drug solutions. Besides their potential applications in drug delivery and wound dressings, these films also seem to be promising materials for making artificial organs.

Source: Nature India, 7th July 2014

India: New Vaccine to fight Cholera

Cholera is currently endemic in more than 50 countries and according to the World Health Organization (WHO), every year cholera affects around 3 to 3.5 million people globally, killing between 100 to 120 thousand. The disease is transmitted by faecal-oral route through contaminated food and water. Symptoms of cholera are primarily due to a toxin, cholera toxin (CT). Researchers from the Institute of Microbial Technology (IMTECH) in Chandigarh in collaboration with



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the National Institute of Cholera and Enteric Diseases (NICED) and the Indian Institute of Chemical Biology (IICB) in Kolkata with funding from India's Department of Biotechnology (DBT) have developed a new live oral cholera vaccine that promises better protection than the currently available killed (or inactivated) vaccines. This 100 percent India-made, India-designed vaccine gives 66 percent sero-conversion after a single dose as opposed to 53 percent by the existing vaccine after two doses. Presently two killed whole-cell vaccines, given orally, are licensed by the WHO. Killed or inactivated vaccines are made from microorganisms that have been killed through physical or chemical processes. The Swedish recombinant B-subunit vaccine 'Dukoral', licensed since 1991, is expensive. The other oral killed vaccine 'Shanchol', marketed by Hyderabad-based Shantha Biotechnics, is a modified form of 'mORC-Vax' developed by a Vietnam-based company using technology transferred by Sweden. These vaccines require two doses for protection. The only licensed oral and live attenuated single-dose vaccine CVD 103-HgR that was used in Indonesia in the 1990s is no longer produced. Killed oral vaccines constitute major advances in cholera vaccine development but they need to be administered in two doses. With the new vaccine a single dose would be enough. The Indian-made live oral vaccine VA 1.4 was developed from a clinical isolate of 'Vibrio cholerae O1 El Tor' strain naturally devoid of the cholera toxin. The vaccine was made after a series of manipulations to introduce into the strain the gene responsible for production of the 'B' subunit of the cholera toxin. Tested in rabbits, the vaccine was found to provide full protection against cholera pathogens. The vaccine was evaluated in a double-blind trial in men and women aged 18–60 years in Kolkata. The vaccine did not elicit any serious adverse effect and sero-converted 65.9% of participants in the vaccinated group after just one dose. In contrast, a 2008 study in the same population using the 2-dose killed oral cholera vaccine showed a sero-conversion rate of only 53%.

Source: *Nature India*, 24th July 2014

Mexico: Navigation Device for Blind People

Mexican researchers have developed an artificial intelligence navigation system for partially or totally blind people that can sense its surroundings in three dimensions. The prototype device is designed to allow users to freely move from one point to another avoiding both static and moving obstacles, and can learn to recognise colours and utility bills. It looks like an adapted pair of glasses and has two sensors that locate objects around the user by bouncing ultrasonic waves off them. It also has two cameras and its batteries allow continuous use for about four hours. The device is also equipped with a GPS (global positioning system) to help users navigate when outdoors. Everything plugs into a tablet computer that processes image and sound data and uses it to calculate distances and build up a three-dimensional image of the user's surroundings. The tablet uses artificial intelligence software to recognise navigation routes and signs acts in a similar way to a car sat nav, providing navigation instructions and warnings through earphones. The prototype took five years to develop. During this period, it was successfully tested by a group of blind girls in the Mexican city of Guadalajara. The girls were asked to navigate between different indoor locations and recognise specific credit cards, utility bills and bank notes. Mexico's National Council for Science and Technology gave the project a total of US\$1.7 million of public money between 2010 and 2013. The device will be on the market early next year and will be commercialised by a company called Qualtop. Similar devices already exist, including low-tech prototypes developed by inventors in Africa. But the Mexican device is unique in several ways, for example, in its use of ultrasound to detect translucent obstacles such as glass and its use of artificial intelligence to recognise objects, signs and places. The device may cost about US\$1,500 once on sale, but it could be made US\$300 more cheaply than that after further developments.

Source: *SciDev.Net*, 4th August 2014

Morocco: R&D Funding for CSP Activity

The Moroccan government has chosen six research and development (R&D) projects involving novel solar thermal and Concentrating Solar Power (CSP) technologies to receive US\$2.3 million from the Moroccan Institute for Research on Solar Energy and New Energy (IRESEN). These initiatives include a project that aims to increase CSP supply to the national grid via micro CSP production. The first part of the project involves modifying existing micro CSP capability, both with and without storage, to better define how its contribution to the national grid can be more reliable and fulfil maximum potential. With a budget of 330,000 Euros, the project will run over three years and will use a prototype micro CSP station with a 10kW capability. Another successful bid for funding came from a project seeking to develop a flash-drying process using solar energy for the phosphate sector. With a budget of 319,000 euros, the project will work on two themes: evaluating the performance characteristics of the technology itself and then flash drying and its integration into a solar source. All six successful projects had to attract additional funding as well as partner with at least one national industrial partner and one national university. Following that, partnerships and input from the industry on a global scale could be sought. IRESEN was founded in 2011 by the Moroccan Ministry of Energy, Mines, Water and Environment to take renewable energy R&D to a nationwide level. Last month, the institute tendered a 1 MWe CSP-Organic Rankine Cycle pilot plant with a small buffer capacity to be located at its Green Energy Park in Benguerir, a city in central Morocco. The project will focus on a decentralized solution with a short execution period and a system that is compact and modular, achieving economies of production and meeting customer needs with less than 10 MW combined heat and power requirement. A new call for proposals for 2015's funding is expected to be made in September.

Source: *CSP Today*, 18th July 2014

Morocco: Swimming Dinosaur

Palaeontologists are reporting the world's first known swimming dinosaur, a 15-metre-long behemoth with a crocodile-like face, feet well suited to paddling and a sail-like structure rising from its spine. The creature, *Spinosaurus aegyptiacus*, also had unusually dense bones, possibly to help weigh it down as it hunted its underwater prey. It is the first dinosaur that shows these really incredible adaptations and there is no doubt that *Spinosaurus* would have done most of its hunting in the water. Researchers have long suspected that some dinosaurs would have occasionally gone for a dip; many modern dinosaurs, in the form of birds, are aquatic. But they have found little evidence of ancient aquatic behaviour, other than possible swipe marks where the foot of a swimming dinosaur may have clawed into a riverbed. In 2010, geochemists used oxygen isotopes in fossil bones to conclude that *Spinosaurus* and its relatives spent much of their time in the water, as a crocodile or hippopotamus does. But until now, not enough *Spinosaurus* bones were available to reconstruct the skeleton and test this idea. German palaeontologist Ernst Stromer found a partial skeleton in Egypt a century ago, but his fossils were destroyed during an allied bombing raid on Munich in 1944. In 2008, while Ibrahim was wrapping up a fossil-hunting expedition in Morocco, a man approached him in the desert town of Erfoud and showed him some bones in a cardboard box. Suspecting that they were important, Ibrahim arranged for them to be sent to the University of Hassan II in Casablanca. The next year, while Ibrahim was visiting the Natural History Museum of Milan, Italy, colleagues there showed him some more *Spinosaurus* remains from Morocco. The colour and texture and size of those bones were exactly like the mysterious bones the man had shown in the cardboard box. Later, Ibrahim and the research team unearthed more *Spinosaurus* remains and reunited them with the bones from the box as well as those from Milan. From that 97-million-year-old skeleton, along with Stromer's notes on his destroyed

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specimens and with related dinosaur fossils, the palaeontologists pieced together the most detailed *Spinosaurus* picture yet. Among other watery adaptations, *Spinosaurus* has nostrils that are located relatively high on its skull, perhaps so that it could breathe while partly submerged. Its teeth are interlocked like a fish trap, and its powerful forelimbs could have paddled through the water. Its feet may even have been webbed, says team member Simone Maganuco from the Milan museum. At the time that *Spinosaurus* lived, what is now eastern Morocco was covered with sprawling lakes, rivers and deltas. As a top predator, the dinosaur would have had been among the rulers of an ecosystem teeming with huge crocodile-like animals, massive sawfish and coelacanths the size of cars. Compared with other dinosaurs in its group, the two-legged, meat-eating creatures known as theropods, *Spinosaurus* has strikingly short rear legs, meaning that the dinosaur walked mainly on four legs. Its centre of gravity would have been relatively far forward, helping it to move smoothly while swimming. The bones, which are currently being studied in Chicago, are destined to return to Casablanca by the end of the year to form the centrepiece of the scientific collection at the University of Hassan II.

Source: *Nature News Alert*, 16th September 2014

Namibia: FAO Support to Namibian Agriculture

A memorandum of understanding (MoU) was signed between the Namibian Standards Institution (NSI) and the Food and Agriculture Organisation (FAO) in Windhoek in July 2014 to strengthen Namibia's goals of better control of food safety, plant and animal pests and diseases affecting agricultural productivity. Technical assistance to the value of N\$40 million was endorsed in support of the FAO programme during the African Union Heads of State Summit in Equatorial Guinea. The MoU will help to align activities, focus on strengthening the capacity of the NSI and related industry players and achieve mutually beneficial results, creating stronger systems of national agro-standards management and higher quality of agro-products and information, culminating in increased output of marketable products and industry competitiveness. FAO will draw on its global experience through its large number of projects covering all aspects of food safety systems, good agricultural practices and certification within a holistic food chain approach in a cost-effective manner.

Source: *New Era*, 7th July 2014

Pakistan: Insect Resistant Plants expressing Spider Venom Toxin (Hvt)

Spiders produce peptide -Hexatoxin-Hv1a (Hvt), a venom toxin with

proven insecticidal properties against arthropods belonging to orders Lepidoptera, Diptera, and Orthoptera. The gene coding for Hvt has been transferred into cotton and tobacco to develop plants with resistance to lepidopteran pests. Researchers from National Institute for Biotechnology and Genetic Engineering (NIBGE), Pakistan and partners assessed the expression of the *-HXTX-Hv1* gene in transgenic plants, and the toxicity of plant-expressed and purified Hvt on target lepidopteran insects and on several non-target species. Insect resistant cotton (Bollgard II) plants were included in the study as comparators. Results showed that larval mortality was 100% on Hvt-transgenic tobacco plants but not on Hvt-transgenic cotton which can be due to significantly lower Hvt expression level in the transgenic cotton. Studies on non-target organisms were conducted with larvae of the predators common green lacewing (*Chrysoperla carnea*) and seven-spot ladybird (*Coccinella septempunctata*), adults of the aphid parasitoid (*Aphidius colemani*), and adult workers of the honey bee (*Apis mellifera*). Even at greater concentrations (40 µg/ml) Hvt did not adversely affect the four non-target species. Purified Cry2Ab2 from Bollgard II plants at 10 µg/ml also did not adversely affect any of the non-target species. Based on the results, Hvt might be useful for developing insecticidal plant varieties to control lepidopteran pests.

Source: *Crop Biotech Update*, 3rd September 2014

Vietnam: Licenses to Four GM Corn Varieties

Vietnam's Ministry of Agriculture and Rural Development (MARD) has granted licenses to four genetically modified (GM) corn varieties to be used for both human consumption and animal feed. This process started four years ago when Vietnam announced it would start field trials of these four varieties of GM corn. The varieties have gone through extensive testing and evaluation since then, as well as being approved by Vietnam's Council of Food Safety for Genetically Modified Food and Animal Feed. The four GM corn varieties, includes Bt 11 and MIR162 developed by Syngenta Vietnam Co. Ltd as well as MON 89034 and NK603 by Monsanto's Dekalb Vietnam Co. Ltd. The licensing agencies say they have determined to their satisfaction that the products have no harmful health effects. Licensing is considered a first step in the creation of a legal framework regarding GM foods, and the Vietnamese government is in the process of speeding up the application of such technologies in agriculture. This is in line with the plan for sustainable agriculture through 2020.

Source: *Crop Biotech Update*, 3rd September 2014

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The key to economic development in a country lies in its ability to innovate and to effectively exploit innovations. In the competitive world, only those countries that possess high-class technologically skilled manpower, indigenous capability in state-of-the-art technologies, and a strong climate of innovation and entrepreneurship can be successful in governing their economy. Outcome of scientific and technological research positively influences innovation process. There are many examples of scientific discoveries or research results having been converted into commercially viable products and processes leading to industrial development. Technological developments in the recent years in the new and emerging areas such as information technology, computers and telecommunications have had a revolutionary impact on the competitiveness of nations. Building a sound technological infrastructure, development and transfer of technologies and promoting academic research - industry links have thus become the key policy issues for improving the future competitiveness of a nation.

The capability for innovation and its diffusion can be developed through a dynamic process involving governments, academic and research institutions and industry with the help of a combination of schemes and programmes for research and development in priority areas of technologies, for the transfer and adaptation of technologies, and for the development of new technology-based industry, backed up by adequate support facilities and suitable institutional mechanisms. For a variety of reasons, the Science & Technology infrastructure and capabilities created in the developing countries have, in most cases, failed to fulfil their potential. In these countries, the real technological requirements of the productive sector have not been adequately appreciated in the formulation and implementation of STI policies. The reasons may stem from financing, management problems, economic factors and policy orientations.

Thus, it is important to have a strategically designed Science, Technology and Innovation (STI) Policy at the national level, commensurate with the challenges of the globalizing society. But, in many developing countries, STI policies are rather focused on research in basic sciences, and do not address to the needs of the local industry and economic conditions. Moreover, most developing countries do not have proper human resource to design their own national STI policies and thus they lack experience of policy formulation and implementation.

Keeping the above in view, the Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre) has identified Science, Technology and Innovation as a thrust area for capacity building and exchange of information and expertise among the developing countries and has been organising a series of activities on relevant topics in various countries. In continuation of these initiatives, the NAM S&T Centre and the Technology Studies Institute (TSI) of the Presidency of Islamic Republic of Iran, announce the organisation of an International Workshop on "Science, Technology and Innovation (STI) Policy Making for Developing Countries" during 28th November – 1st December 2014 at Kish Island, Iran.

The Workshop is primarily designed for STI policy makers, researchers, government officials and representatives of S&T agencies and institutions in the developing countries engaged in activities related to STI. Completed Nomination Forms may be submitted directly to the NAM S&T Centre as early as possible, but latest by **Friday, 24th October 2014**.

For further details, please see the Website of the NAM S&T Centre: www.namstct.org.

EDITOR: Mr. M. Bandyopadhyay ❖ ASSISTANT EDITORS: Ms. Radhika Tandon, Mrs. Pinky Singh, Ms. Parul Sehgal and Ms. Shania Tahir

COMPILATION & DESIGN: Mr. Pankaj Buttan ❖ PUBLISHED BY: Prof. Arun P. Kulshreshtha, Director General, Centre for Science & Technology of the Non-Aligned and Other Developing Countries (NAM S&T Centre), Core 6A, 2nd Floor, India Habitat Centre, Lodhi Road, New Delhi-110003 (India)
Ph: +91-11-24645134, 24644974, Fax: +91-11-24644973 E-mail: namstcentre@gmail.com, namstct@bol.net.in ❖ Website: <http://www.namstct.org>

Lovely Printers, New Delhi, E-mail: lovely_printers@yahoo.com; Ph: 9811086866.