

**CENTRE FOR SCIENCE AND TECHNOLOGY OF THE NON-ALIGNED AND
OTHER DEVELOPING COUNTRIES (NAM S&T CENTRE)**

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**3RD INTERNATIONAL WORKSHOP
ON MINERAL PROCESSING AND BENEFICIATION
HARARE, ZIMBABWE**

11- 14 SEPTEMBER 2014

BRIEF REPORT

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 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 foreign delegates and Zimbabwean Ministers, Members of Parliament, senior government officials, mineral experts and professionals, faculty members and students.

After the welcome remarks by Dr. W T Mbizvo, Permanent Secretary, Ministry of Higher & Tertiary Education, Science and Technology Development (MHTESTD), Zimbabwe, H.E. Dr. O.N. Muchena, MP and Honourable Minister of MHTESTD, 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 in his address, 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 and said 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 is worrying that the importance of the NAM has diminished politically at the moment and emphasised 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 themselves together through trade and value addition to their natural resources and transform the movement into an economic power house.

The President 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 offered to host a Non-Aligned Movement Science & Technology Centre of Excellence on Minerals Processing and Beneficiation in Zimbabwe for the benefit of the member states and the development of backward and forward linkages in the field.

He then declared open the International Workshop and also launched a journal on Minerals Beneficiation and Value Addition.

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 Mpopu, 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.

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; '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. Maponga; '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 Mpofo.

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'.

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.

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