

**REPORT ON THE NANOSAFETY TECHNICAL WORKSHOP: CAPACITY
BUILDING FOR THE SOUND MANAGEMENT OF NANOMATERIALS FOR THE
AFRICA REGION IN LUSAKA, ZAMBIA
FROM APRIL 16 TO 17, 2015**



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EXECUTIVE SUMMARY

The field of nanotechnology and manufactured nanomaterials (“nano”) is growing worldwide. While creating economic and social benefits, the potential risks that nano poses to human health and the environment are still not fully known. Notwithstanding, nano-containing products are placed on the market and utilised thereby creating need for awareness and employment of strategies to effectively manage nano and secure human health and the environment.

In view of the foregoing, the African Region held a Nanosafety Technical Workshop on from April 16 to 17, 2015 at the Cresta Golfview Hotel in Lusaka Zambia. Funded by the Government of Switzerland, the workshop was facilitated by the United Nations Institute for Training and Research (UNITAR) in conjunction with the Government of the Republic of Zambia and the Organisation for Economic Co-operation and Development (OECD).

The main objective of the workshop was to build capacity for the Sound Management of Nanomaterials for the African Region. In view of this, the structure of the workshop proceedings was such that awareness on nano technology was raised amongst participants through various presentations that were made by different experts. The workshop also involved group work and plenary which ensured active engagement of all participants.

Subsequently, the following were the major outcomes of the regional workshop:

- i. Identification and prioritisation of the major nano needs in the African region;
- ii. Establishment of a nano network (constituting all present at the workshop);
- iii. Constitution of a team of eight experts to coordinate the nano network; and
- iv. Constitution of a team of four experts to develop a concept note on nano.

The workshop was attended by 43 participants representing 10 different African Countries, the United States of America and Switzerland. These participants consisted of individuals from different backgrounds which included academia, Government, Intergovernmental Organisations, Quasi Government, private sector and media.

1.0 INTRODUCTION

Nano is a key topic under the Strategic Approach to International Chemicals Management (SAICM). Resolution III/2E of the third International Conference on Chemicals Management (ICCM3) invited “relevant international organizations, such as UNITAR, todevelop guidance and training materials, andenhance stakeholder capacity for the sound management of nanotechnologies and manufactured nanomaterials.” As such, UNITAR is committed to working with national, regional and global partners to help address nano related challenges. Capacity development services under considerations include implementation of additional nano country projects; training and knowledge-sharing on nano regulations; trainings on nano-related occupational health safety issues for workers; training on labelling standards for nano-containing products (e.g. for customs); and further public awareness raising.

By working within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC), UNITAR has implemented since 2009 a range of activities to support developing countries to raise awareness on nanosafety issues and consider the implications of nano-based and nano-containing products traded across borders. These activities include initial and follow up nano regional workshops in the African, Arab, Asia-Pacific, Central and Eastern European, Latin America and Caribbean regions. The focus for initial workshops was awareness raising on current and potential applications of nanomaterials while follow up workshops focused on developing consensus on new nano work areas and activities to be included in SAICM’s Global Plan of Action. The activities were funded by the Government of Switzerland.

In view of the foregoing and availability of nano materials on the market and in use, a workshop was organized for the manufactured nanomaterials/nanotechnology for the African region from 16th to 17th April, 2015 in Lusaka, Zambia. Participants were drawn from different countries and different sectors (refer to appendix I). The workshop was funded by the Government of Switzerland and implemented by UNITAR in conjunction with the Government of the Republic of Zambia through the Zambia Environmental Management Agency (ZEMA) and the Organisation for Economic Co-operation and Development (OECD).

1.1. WORKSHOP OBJECTIVE

The objective for the Nanosafety Technical Workshop was to: Build capacity for the Sound Management of Nanomaterials for the African Region

2.0 OFFICIAL OPENING AND WELCOME REMARKS

The Director of Programmes, Ms. Irene L. Chipili called the meeting to order at 09:00hrs, welcomed all the delegates present and invited them to introduce themselves. She further invited the Acting Director General, Mr. Patson Zulu who introduced the Honourable Davies Mwangi, Deputy Minister from the Ministry of Lands, Natural resources and Environmental Protection. Ms. Chipili then invited the UNITAR representative, the Acting Director General and the Honourable Deputy Minister to give their opening remarks. Key issues highlighted by the three dignitaries included what nanoparticles are, potential health hazards posed by nanoparticles and the need for best management practices to ensure sound management of nanomaterials. Please refer to appendices ii, iii and iv for details of the submissions made by the three dignitaries.

3.0 PRESENTATIONS

Part of the workshop focused on raising awareness on nanomaterials/particles through presentations made by participants from different countries and sectors. In this regard, a total of 24 presentations were made and below is a summary of the presentations while details may be accessed at:

<http://www.unitar.org/cwm/nanosafety-regional-workshop-african-region-zambia>

<https://www.dropbox.com/sh/pu50wtlgw87onwj/AADB4qOdfj5tGNV8DvyfAa?dl=0>

3.1 THE BASEL, ROTTERDAM AND STOCKHOLM (BRS) CONVENTIONS

Presenter: Ms. Abiola Olanipekun-Chief Scientific Support Branch, BRS Secretariat.

The BRS entered into force on May 5, 1992, February 24, 2004 and May 17, 2004 with current number of parties summing up to 183, 154 and 174 respectively. In addition to this background, the presentation highlighted the objectives and scope of each of the conventions; the operations of the Stockholm Convention (SC) through the POPs Review Committee (POPRC); operations of the Rotterdam Convention (RC) through the Chemicals Review

Committee (CRC); National reporting for the Basel Convention (BC) and the SC; Basel and Stockholm Conventions support for implementation; and institutional aspects of the BRS.

3.2 POLYPROPYLENE NANOCOMPOSITES PHOTO-OXIDATION EFFECTS

PRESENTER: Dr. Magatte Diagne-Medical Physicist at University Hospital Aristide

The presentation focused on the effects on polypropylene nanocomposites photo-oxidation effects on thermal and fire retardancy. It also brought out methods by which polymer nanocomposites may be produced. These methods were identified as intercalation of a suitable monomer followed by polymerization and also through polymer intercalation from solution and direct polymer intercalation. Having shared the methods through which polymer nanocomposites may be produced, the presenter proceeded to bring out nano materials; preparation of nanocomposites; characterization of nanocomposites; photo-oxidation of the nanocomposites; fire retardancy of the nanocomposites; thermal stability; and the findings. The conclusions drawn from the study were as follows:

- i. The true PP/clay nanocomposites exhibited improved thermal stability and fire retardancy properties;
- ii. Dramatic change of these properties observed in the UV degraded nanocomposites; and
- iii. Outstanding improvement of fire properties was achieved on UV irradiated PP-g-MA due to crosslinking reactions that generate a compact structure, which is less easy volatilizable.

3.3 AFRICA NON GOVERNMENTAL ORGANISATION PERSPECTIVE

Presenter: Emmanuel Odjam-Akumatey

The presentation brought out realities of what transpires on the nano market compared to expectations; brought out what is known about the effects of nanomaterials/particles on health; the uncertainty of science regarding nano; efforts made in awareness on nanomaterials/particles; outcomes of some research carried out on nanomaterials/particles; and recommendations on the way forward in sustainable management of nano/materials/particle.

3.4 NANO OCCUPATIONAL, CONSUMER AND ENVIRONMENTAL EXPOSURE

Presenter: Vladimir Murashov-OECD

The presentation brought the involvement of the Organisation for Economic Cooperation and Development's work in nanomaterial exposure; nanomaterial lifecycle; nanomaterials and consumer products; waste management; nano exposure standards; and nano assessments.

3.5 PRESENTATIONS ON NANOMATERIALS BY GEORGE KARLAGANIS

3.5.1 IOMC TOOLBOX FOR DECISION-MAKING IN CHEMICALS MANAGEMENT

The IOMC was established in 1995 with an objective to strengthen international cooperation in the field of chemicals and to increase the effectiveness of the organisations' international chemicals programmes. Since its establishment, IOMC participating organisations have developed hundreds of tools and the challenge has been to identify the most appropriate tool to address specific national issues. In this regard, the presenter discussed possible solutions to the challenge through the IOMC toolbox; the IOMC toolbox scope; objectives; examples; and IOMC toolbox as a platform for collaboration.

3.5.2 NANOMATERIALS CLASSIFICATION AND LABELING

The presentation provided by UNECE (United Nations Economic Commission for Europe) focused on how the United Nations (UN) has contributed to nanomaterials classification and labelling through the UN Economic and Social Council (ECOSOC) and the Global Harmonised System of Classification and labeling of chemicals (GHS).

3.5.3 NANOTECH: RISK ASSESSMENT AND SAFETY COMPLIANCE-THAILAND

The presentation provided by Nanotec in Thailand brought out how issues of nanomaterials are being addressed in the country. Specifically, it brought out how policy development, national central laboratories, technology transfer, research and development play a role in nanotechnology and nano management within Thailand.

With respect to the roles for government, the nanotechnology assessment in Thailand resulted in the identification of the following as the four as government roles in nano management:

- i. Policy development;
- ii. Research development;

- iii. National central lab; and
- iv. Technology transfer.

3.5.4 OVERVIEW OF UNITAR'S NANO PROGRAMME

The presentation provided an overview on UNITAR's Nanotechnology and Manufactured Nanomaterials programme and progress. The overview was from the perspective of the UNITAR SAICM involvement, Nano in SAICM, UNITAR Nano activities, background to the UNITAR Nano pilots, overview to the UNITAR Nano pilots, key outcomes of the programme to date, national projects and involvement at the third International Conference on Chemicals Management (ICCM-3) and the next steps for the nanotechnology and manufactured nanomaterials programme.

3.6 GUIDANCE ON DEVELOPING A NATIONAL NANO POLICY AND PROGRAMME

The presentation outlined suggested steps for the development of a national nano programme using the UNITAR guidance document. In summary, the guidance document provides working definitions, nano applications, nano environmental health concerns, worker health and safety associated with nano, research and training in nano, ethical considerations, relevant international work, how to go about developing a nano national policy, priority setting for nano, establishing a coordinating mechanism, stakeholder training, establishing an action plan for implementing .

There has been a remarkable development and application of nanotechnology, manufactured nanomaterials, and nano enabled products throughout the world, which have many potential benefits, as well as potentially creating health, environmental risks, and social concerns. In response to the recognition that nanotechnology and nanomaterials constituted an emerging issue at ICCM2 and that countries should prepare a national report on their use and management of such materials, UNITAR produced a guide for developing a national technology policy and programme. This was done with support from the Government of Switzerland.

This guidance gives suggested ideas to address nano issues, provides an introduction to nano, including the latest developments both regarding applications and research on potential risks to the environment and human health. The guidance is further enriched with examples of progress on addressing nano issues from various countries.

Part A provides a brief overview of nanomaterials, their applications and approaches towards institutional governance, risk management, and ethical and social implications of this innovative technology.

Part B of the guidance, provides a draft methodology to assist countries to undertake awareness raising and an analysis and assessment of their national strengths, weaknesses, and gaps in the management of nano. The suggested methodology addresses the need to prepare a comprehensive stakeholder driven nano policy that includes a national nano assessment in a manner comparable with the preparation of a country's National Profile for Chemicals Management. Subsequent steps in the development of a national nano policy are outlined for stakeholders to gather data and information necessary to understand their national nano situation, which is needed to prepare their policy. These steps include establishing a coordinated and co-operative nano programme to unify the issues associated with nano management, the establishment of national priorities, and the targeted training of a wide range of stakeholders who may be potentially exposed to nanomaterials

Implementation of the policy to establish a programme for the safe management of nano is then outlined. Following the pilot phase and based on country experiences and lessons learned, it is expected this guidance will be updated and made broadly available for all interested stakeholders.

3.7 MAGNETIC NANOPARTICLES

Presenter: Professor Luke Chimuka: University of Witwatersrand, South Africa

Professor Chimuka presented on the preparation, characterisation, and application of NaHCO_3 leached bulk U(VI) imprinted polymers endowed with γ -MPS coated magnetite in contaminated water. Conclusions drawn from the research and presented at the workshop were that:

- i. The preparation of magnetic materials is promising;
- ii. Further assessment of magnetic responses (SQUID and VSM) is required;
- iii. Both magnetic IIPs and NIPs showed potential in the uptake of U(VI) from contaminated solutions;
- iv. Magnetic IIPs had superior performance compared to the control due to imprinting; and
- v. Generally low uptake due to incorporation of the magnetic core.

3.8 OECD WORK ON CHEMICALS AND MANUFACTURED NANOMATERIALS

By OECD

The OECD's work on environment, health and safety was presented. OECD's programme on nanosafety concentrates on human health and environmental safety implications of manufactured nanomaterials (limited mainly to the chemicals sector) in 34 countries. It also ensures that the approach to hazard, exposure and risk assessment is of a high, science-based, and internationally harmonised standard. OECD continues to make all its products publicly available and free of charge.

OECD Council Decision on Mutual Acceptance of Data in an Assessment of Chemicals C (81) 30 states that "*Data generated in the testing of chemicals in an OECD Member country in accordance with OECD Test Guidelines and OECD Principles of Good Laboratory Practice shall be accepted in other Member countries for purposes of assessment and other uses relating to the protection of man and the environment.*"

To address exposure measurement and mitigation, materials published include:

- i. Preliminary Analysis of Exposure Measurement and Exposure Mitigation in Occupational Settings: Manufactured Nanomaterials (2009)
- ii. Emission Assessment for Identification of Sources and Release of Airborne Manufactured Nanomaterials in the Workplace: Compilation of Existing Guidance (2009)
- iii. Comparison of Guidance on Selection of Skin Protective Equipment and Respirators for Use in the Workplace: Manufactured Nanomaterials (2009)
- iv. Compilation and Comparison of Guidelines Related to Exposure to Nanomaterials in Laboratories (2010)
- v. Prioritize gaps in risk assessment in 2013
- vi. Report on Regulated Nanomaterials in 2014

In addition, a survey on consumer and environmental exposure is underway.

3.9 NANOTECHNOLOGY RELATED WORK AT THE COPPERBELT UNIVERSITY,

By Dr. Phenny Mwaanga-Copperbelt University, Zambia

The presentation highlighted that nanotechnology related work in Zambia was still in its infancy and there is no legislation on production, use and safety Manufactured Nano Materials (MNMs). The work on MNMs in Zambia is mainly on safety evaluation, environmental remediation, enhancing electrical conductivities and biosensing. Work on MNMs at the Copperbelt University (CBU) started in 2013, after entering into collaboration with Mintek of South Africa for the period 2013- 2017. As way of building capacity, synthesis and characterization of Copper (II) oxide (CuO) and Zinc oxide (ZnO) Nano Particles (NPs) studies were undertaken by undergraduate students.

The tests were conducted using organism and biochemical responses to evaluate the effects of MNMs. The tests were however, done for a brief period and as a result, effects can be underestimated. To overcome this draw back, CBU is using proteomics and metabolomics which requires use of LC-MS and peptide mass fingerprinting and search engine (Mascot) for protein identification.

3.10 SAFETY TESTING AND RISK ASSESSMENT-NANUFACTURED NANO

By the OECD

Testing and assesment of manufactured nanomaterials was conducted to review existing OECD Test Guidelines (TGs) for their adequacy in addressing MNs and test a representative set of manufactured nanomaterials for Environment, Health and Safety (EHS) (including alternative methods.

A list of endpoints addressed by the OECD testing programme included Nanomaterial Information/Identification, Physical-Chemical Properties and Material Characterization, Environmental Fate, Environmental Toxicology, Mammalian Toxicology, Material Safety, Inhalation Toxicity and Environmental fate and eco-toxicity. Some if the guidelines produced focus on:

- Dispersibility and Dispersion Behavior of NM in Aquatic Media;
 - Aquatic (and Sediment) Toxicology Testing of Nanomaterials;
 - Accumulation Potential of NM TG for Dissolution Rate of NM in the Aquatic Environment;
- and

- Development of a Draft Test Guideline for NM Removal from Wastewater.

3.11 STRATEGIC APPROACH TO INTERNATIONAL CHEMICALS MANAGEMENT

By the SAICM Secretariat

Strategic Approach to International Chemicals Management (SAICM) is an international non-binding policy framework to support efforts to achieve the Johannesburg Plan of Implementation (WSSD) goal for chemicals, notably to “achieve by 2020 that chemicals are used & produced in ways that lead to the minimization of adverse effects on human health and the environment”

It was adopted by Ministers, heads of delegation and representatives of civil society and private sector at International Conference on Chemicals Management in 2006 in Dubai.

Key Characteristics of SAICM as a framework for global action for the sound management of chemicals were discussed. The SAICM structure/governing body comprising the International Conference on Chemicals Management (ICCM) and Open-ended Working Group (OEWG) was presented. Key issues to achieving SAICM implementation were identified as follows:

- i. Involvement of all stakeholders- Government, non-governmental and inter-governmental;
- ii. High-level commitment from all sectors – health, environment, industry, labour, economic;
- iii. Emphasis on the sound management of chemicals as a sustainable development issue;
- iv. Implementation dependant on actions at national, regional and international levels; and
- v. Early enabling actions - to build necessary capacity and relevant stakeholder participation.

3.12 PROMOTION OF NANOTECHNOLOGY AS A TOOL OF CHANGE IN NIGER

By Doctor Hamidine Mohamadou-Niger

Niger has been teaching undergraduate and postgraduate courses on nanotechnology. Laboratory experiments on LEDs particularly how to get white Light-Emitting Diode (LED) from grouping the three colors red, green and blue have been conducted. Application of Nanotechnology for Energy development in Niger has focused on:

- i. Research and development of solar cells using nanotechnology as alternative energy;
- ii. Modification of the photovoltaics structural properties and increase in their efficiency through the use of materials like lead-selenide; and
- iii. Continued research on the possible use of nanotechnology (nanowires and nanocoatings) for efficient energy transmission ;

Financial, capacity (including technology, management and coordination), institutional and regulatory, market and competitiveness were identified as barriers to NS.

3.13 EFFECT OF PHOTO-OXIDATION-NANOTHERMAL AND FIRE RETARDANCY

By Dr Magatte Diagne

Nanocomposite technology has been the topic of several scientific papers in the last years. The typical methods used to produce polymer nanocomposites were intercalation of a suitable monomer followed by polymerization and polymer intercalation from solution and direct polymer intercalation. The common techniques that were used to evaluate the state of mixing of nanocomposites were X-Ray Diffraction (XRD) and Transmission Electron Microscopy (TEM). Photo-oxidation of the nanocomposites was carried out. To determine fire retardancy of the nanocomposites, the cone calorimetry was used. The findings revealed that the true PP/clay nanocomposites exhibited improved thermal stability and fire retardancy properties. A dramatic change of these properties was observed in the UV degraded nanocomposites. On the other hand, an outstanding improvement of fire properties was achieved on UV irradiated PP-g-MA. This was due to crosslinking reactions that generate a compact structure, which is less volatile.

3.14 NANOTECHNOLOGY GOVERNANCE: ESSENTIAL BUILDING BLOCKS

By Professor Ndeke Musee

The following were highlighted as governance challenges:

Diverse educational and knowledge dissemination mechanisms within and across countries; Overlaps from local to global levels of governance; Lack of budgets for nanotech risks; Use of nanotech for armory (military); Appropriateness of current nanotech applications appropriate to developing country's needs; and skewed power and control on nano promotion and implementation. The following are recommended to help address these challenges:

- i. Adaptive management and collaborative governance;
- ii. Strengthen co-ordination among various players (some regulate product and others processes);
- iii. Close communication gaps (scientists, regulators, decision/policy makers, media, industry);
- iv. Set budgets to address nanotech risks, skills development to estimate real risks of nanotech;
- v. Set appropriate nanotech applications relevant to the developing country's needs;
- vi. Set infrastructure that aids all countries to harmonize measurements (regulations); and
- vii. Development and implementation of national, regional and global governance structures.

3.15 SWISS ACTION PLAN FOR SYNTHETIC NANOMATERIALS

Nano technology is a rapidly growing research and development area with increasing significance for business, research and society. Risks posed by synthetic raw materials in nanotechnology have been identified. The Swiss Action Plan for synthetic nanomaterials illustrates the work required in Switzerland for the safe handling of nanomaterials. It was adopted by the Federal Council in April 2008 and will continue the action plan until 2019. The objectives of the action plan include:

- i. Development of regulatory framework conditions for the responsible handling of synthetic nanomaterials;
- ii. Creation of scientific and methodical conditions aimed at identifying and preventing potential harmful effects of synthetic nanomaterials on health and the environment;
- iii. Promotion of the public dialogue about opportunities and risks of nanotechnology; and
- iv. Better utilisation of existing tools for the development and rollout of sustainable nanotechnology applications.

The creation of regulatory framework conditions is divided into two phases:

Phase 1 (short and medium term): Strengthening of corporate responsibility through different tools (precautionary matrix, guide to self-regulation, support of private-sector codes of conduct, guidelines for nano-specific safety data sheets, improved consumer information, disposal guide)

Phase 2 (medium and long term): Development of legal framework conditions for the safe handling of synthetic nanomaterials (review of measures exceeding existing provisions and coordination with developments abroad)

The increasing scientific, economic and societal significance of nanotechnology was the impulse for developing the action plan for synthetic nanomaterials. The plan is therefore, aimed at staking out new opportunities and utilising sustainable applications. At the same time, it will help assess possible risks extensively and promptly and, if necessary, implement measures to protect the environment and public health.

3.16 REPORT ON ICCM 3

Held in Nairobi, Kenya from 17th to 21st September, 2012, the third International Conference on Chemicals Management (ICCM3), marked a major milestone in the implementation of the Strategic Approach since its adoption in 2006. The Conference reviewed progress in the implementation of the Strategic Approach with tangible data on the 20 indicators of progress adopted at the second session. The Conference evaluated implementation, addressed emerging policy issues, considered new activities for addition to the Global Plan of Action, evaluated the financing of the Strategic Approach and took strategic decisions for the future including the consideration of recommendations from the Executive Board of the Quick Start Programme regarding the future of the Programme and its trust fund, as contributions will only be accepted until September 2012. ICCM3 featured a high-level dialogue, incorporating opportunities for formal statements, as well as other special events.

Among the issues highlighted during the meeting were the following:

- i. need for long-term financing for the Strategic Approach that was sustainable, predictable, adequate and accessible;
- ii. overall resources for implementation of the Strategic Approach should increase;

- iii. it was important to recognize the call in the Rio+20 outcome document for achievement of the 2020 chemicals management goal;
- iv. the Strategic Approach should be strengthened as part of a robust, coherent, effective and efficient system for sound chemicals management;
- v. it was necessary to include the Strategic Approach in any solution to the problem of long-term financing for chemicals management;
- vi. the current draft of the Executive Director's proposal needed further development and revision and should be the subject of broad consultation and input by stakeholders;
- vii. it was necessary in an integrated long-term approach to financing to address the question of how to allocate resources between legally binding obligations and voluntary commitments to ensure sufficient funding for the latter.

With reference to nanotechnology and manufactured nano materials, representatives drew attention to the lack of available information on the benefits and risks posed by manufactured nanomaterials and the ethical and social issues they raised. They therefore supported technical, institutional and legal information sharing, technology transfer and capacity-building activities, especially in relation to health and environmental protection, so as to develop effective precautionary national and international regulations for the use and disposal of such products.

Government of Switzerland and the UNITAR reported that they had initiated three pilot projects on nanosafety in Africa, Asia and Latin America and the Caribbean. They also underlined the important role that the Strategic Approach played in research and dissemination of information on nanomaterials and said that they regarded it as the main platform for debate on effective policy recommendations. The meeting highlighted the importance of global collaboration in the areas of nanosafety, risk management and public awareness, including workshops on nanosafety and risk management, nano standardization and regulations, and nanosafety guidelines for factory workers, laboratory personnel and consumers, in line with international best practices.

3.17 ICCM-4 DRAFT REOLUTIONS ON NANO

The fourth International Conference on Chemicals Management (ICCM4, 28 September to 2 October 2015) will discuss a proposed resolution on nanotechnologies and manufactured

nanomaterials which would call for continued implementation of prior resolutions and gives special emphasis to, *inter alia*:

- Facilitating the exchange of information on nanotechnologies and the sound management of manufactured nanomaterials (e.g. through an appropriate clearing house mechanism)
- Developing international technical and regulatory guidance and training materials for the sound management of manufactured nanomaterials based on compilation of pertinent information; and
- Welcoming the work of the UN Sub-Committee on GHS in assessing the GHS criteria for the classification of a number of nanomaterials and encouraging it to continue its efforts.

The draft resolution notes the need to enhance capacity on sound management of manufactured nanomaterials particularly in developing countries and countries with economies in transition.

4.0 PLENARY

Issue 1: Nano race: It was observed that the concept of a “nano race” is cardinal because every living person interacts with nanomaterials and therefore all are part of the nano race. As such, there is need to do rise to the occasion and sustainably manage nanomaterials. In this regard generating information and packaging it in a manner which will appeal to the political leaders to ensure buy-in is important in Africa. Thereafter, the institutional and organisational framework can be put in place and operationalized.

Issue 2: Mainstreaming of nanosafety in environmental impact assessment:

Mainstreaming nanosafety in environmental impact assessments is difficult. This is because nano particles are difficult to trace in organisms and one may not be able to know whether the impacts are due to the particle’s nature, its interaction with other materials or if they are responsible for the impacts at all.

Issue 3: The eligibility criteria for the countries involved in the pilot projects for national health technology programme:

The countries that participated in the pilot projects were selected based on the interest they expressed in the project. The window of opportunity is still open for interested countries through expression of interest to the Swiss delegation at the upcoming 2015 BRS COPs in Geneva.

Issue 4: Promotion of nano research:

Participants were encouraged to engage undergraduate, in addition to postgraduate students, in research as this would form a strong foundation for nano research.

Issue 5: Need to build a Nano laboratory:

Issue 6: Need to have mechanisms in Africa to raise awareness on nano

Issue 6: Precautionary Issues:

There is need to ensure that nanomaterials/particles are incorporated in the global harmonization system (GHS). But there is need to build awareness so that the general public will understand what nano is, health hazards associated with nano and best management practices. The starting point for this will be to create understanding that nano particle products exist in economies; build capacity; and carry out research to inform awareness, policy, institutional and organisational framework.

5.0 IDENTIFYING THE NEEDS IN NANO THE AFRICAN REGION

The participants were divided in two groups and proceeded to identify needs that that Africa as a region has with regard to nano. From these breakaways, two lists of identified needs were presented as reflected in appendices V and VI of this report. Thereafter, it was decided that the chairpersons and the rapporteurs from these groups meet to consolidate the identified needs. The list below is a reflection of the **consolidated needs** identified by the participants:

I. IDENTIFYING THE NANO NEEDS OF THE AFRICAN REGION

- A. Establish status of nanomaterials/products and nanosafety in Africa by doing a needs assessment (1st priority)

B. Identified three primary needs

- i. Expertise;
- ii. Policy, regulatory framework, institutional arrangements; and
- iii. Infrastructure.

II. EXPERTISE (Human resource)

- i. Research;
- ii. Trainers;
- iii. Technicians;
- iv. Campaigners;
- v. Regulator;
- vi. Administrators;
- vii. Policy makers; and
- viii. Collaboration.

III. POLICY, REGULATORY FRAMEWORK, INSTITUTIONAL ARRANGEMENTS

Examine existing policies (environment, health, energy, agriculture, legal framework etc.), identify the gaps and make amendment to be address nanosafety)

IV. INFRASTRUCTURE

A. Research

- i. Laboratories, equipment etc.;
- ii. Maintenance of infrastructure; and
- iii. Carryout national audit (infrastructure, equipment, expertise).

B. Laboratories (certified) for analysis/assessment

C. Training

D. Facilities for administrators and regulators

V. ACTIONS

- i. Develop/establish an African network on nanosafety;
- ii. Carry out status survey of nanomaterials/nanoparticles;
- iii. Develop/establish national working groups
- iv. Develop/strengthen coordination mechanisms;
- v. Sustained awareness raising and sensitization activities on Nanomaterials/products and nanosafety;
- vi. Develop legal framework for nanosafety;
- vii. Carry out capacity building exercises;
- viii. Develop guidelines for workplace safety; and
- ix. Monitoring of nanomaterial/particles in industry.

3.18 PLENARY-CONSOLIDATED LIST OF IDENTIFIED NEEDS IN AFRICA

After substantiating the consolidated list, the workshop adopted the list of identified needs as the regional needs by Africa as identified by the workshop participants. Further, the workshop recognized the submitted list as reflecting common issues in Africa and also as a priority. It was therefore resolved that further to the workshop, countries may proceed to prioritise their needs based on an established weighted matrix. To this effect, the planned session with breakaway groups to prioritise needs and identify common issues fell off.

6.0 RESOLUTIONS

Based on the actions identified under 6(v), the following resolutions were made by the workshop:

I. Establishment of a Nano network

- a. To make the network function, workshop delegates should be part of the initial nano network;
- b. Initial engagement for the network will be done electronically;
- c. To have the following as the coordinating group (Secretariat) for the network:

- i. Dr. Munyati Onesmus-Zambia;
- ii. Melissa Vetten-South Africa;
- iii. Emmanuel Odjam-Akumatey-Ghana;
- iv. Njagi Njomo-Kenya;
- v. Magatte Diagne-Senegal;
- vi. Muhammed Abdabrahaman-Sudan; and
- vii. Professor Katima Jamidu-Tanzania.

II. Development of a nano concept note

Experiences were shared by Mr. David Kapindula and Mr. James Mulolo on how project ideas were developed and funded for Poison Centers in Africa and various Africa Institute projects. Based on their experiences, it was decided that a nano project concept note be developed to potentially pave way for a larger project in future. The developed concept shall take into consideration the identified priorities which are reflected in the consolidated list of needs identified in Africa as well as actions that require to be taken. The team to develop the concept note consists of Professor Ndeke Musee-South Africa; Mr. James Mulolo-Africa Institute; Mr. David Kapindula-Zambia; and Professor Katima Jamidu-Tanzania.

Deadline for development of the concept note: September, 2015 before ICCM 4.

- III.** Circulate the recommendations of the workshop report to other networks where participants belong to and otherwise for their information and also to ensure non-replication of the ideas and projects.
- IV.** A drop box account to be opened and all workshop presentations to be placed here and the link sent to all workshop participants, in addition to the UNITAR website.
- V.** Workshop report to be circulated in the course of next week to delegates for their information. Thereafter the report will be forwarded to UNITAR.

7.0 CLOSING REMARKS

Mr. George Karlaganis-UNITAR representative:

He thanked Zambia and ZEMA for hosting the meeting. He also thanked group leaders and all delegates for their involvement in the meeting and looked forward to the next chapter of the nano issues.

Ms. Abiola Olanipekun-BRS Secretariat:

She thanked the Government of the Republic of Zambia for hosting the workshop and conveyed the commitment of the BRS to the work on nano safety. She further expressed that the workshop experience was important in working towards nano safety. It is because of the importance that the BRS attaches to nano safety that they offer support to UNITAR in nano safety activities. Finally, gratitude was expressed to all workshop participants for the fruitful deliberations. The BRS is committed to working closely with every one and supporting building of necessary capacity.

Mr. Maxwell Nkoya:

He expressed his pleasure at coordinating the workshop and thanked each of the members of the Secretariat and workshop participants for their commitment and hard work. It was highlighted that the establishment of a nano network in a step forward in building capacity in nanosafety and will therefore feed into the ICCM 4 as well as individual countries.

AG DG Mr. Patson Zulu:

The Acting Director General appreciated the commitment of each participant to attend the capacity building workshop and the fruitful deliberations. He hoped that the discussion would have a significant input to nano management in Africa. He finally urged participants to go back to their countries and ensure political buy in with regard to issues of nano safety. He concluded by thanking delegates, the Swiss government and all who made the workshop a success.

There being no other business to discuss, the meeting was closed at 16:35 hours.

8.0 APPENDICES

APPENDIX I: LIST OF PARTICIPANTS

No	Family Name	First Name	Gender	Nationality	Title	Name Of Organisation	Type of Organisation	Email Address
1	Mohammed	Abbas	Male	Sudan		Ministry Of Industry		abas135@yahoo.com
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22	Zulu	Patson	Male	Zambia	Mr	Zambia Environmental Management Agency	Semi	pzulu@zema.org.zm

No	Family Name	First Name	Gender	Nationality	Title	Name Of Organisation	Type of Organisation	Email Address
							Government	
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APPENDIX II: SPEECH BY HONOURABLE MWANGO-DEPUTY MINISTER LNREP

The Swiss ambassador based in Harare, permanent secretary- ministry of lands, natural resources and environmental protection, director environment- ministry of lands, natural resources and environmental protection, Director general of Zambia environmental management agency, The representative from the united nations institute of training and research (UNITAR) International and local experts, Invited guests, Distinguished ladies and gentlemen.

It gives me great pleasure to join you today in this important and timely nanosafety technical workshop on "*capacity building for the sound management of nanomaterials for the African region.*" On behalf of the government of the republic of Zambia, i wish to express my gratitude to the United Nations institute of training and research (UNITAR), the strategic approach to international chemicals management (SAICM) and the government of Switzerland for the support rendered to Zambia. The country is privileged of being the first African country to host this technical workshop on the safety of manufactured nano materials and nanotechnology.

Ladies and gentlemen, before i address the specific issues on the safety of manufactured nano materials and nanotechnology, allow me to highlight the genesis of sound chemicals management in general. As some of you may be aware, the most significant milestone was the historic first session of the international conference on chemicals management (ICCM) in Dubai on 6th February, 2006 when the global community endorsed the strategic approach to international chemicals management (SAICM) as a policy framework for international chemicals management. I am pleased to inform you that Zambia was present at this historical conference which endorsed SAICM.

Since 2006, Zambia has made a number of strides towards the fulfillment of its commitments to SAICM. These key milestones include:

- i. Implementation of a project called "mainstreaming sound management of chemicals issues into national development planning" in November 2007 with the assistance of United Nations Environment Programme (UNEP) and United Nations Development Programme (UNDP). The main objective of this project was to develop a plan of action for

mainstreaming of national priorities related to sound management of chemicals into Zambia's national development plans and programmes in line with SAICM's objectives.

The key advantages of this principle are integration of chemical issues into national plans, linking the impact of chemicals to human health and the environment, optimizing the use of national resources and harmonizing chemicals management and national policy.

- ii. Secondly, in line with the SAICM principle of multi-stakeholder participation, my government in 2007 formed an inter-agency coordinating mechanism (ICM) consisting line ministries, civil society organisations, academia and the private sector. The ICM has been working tirelessly to realize SAICM's plan of implementation goal that "by 2020, chemicals will be produced and used in ways that minimize significant adverse impacts on the environment and human health." This agency has been involved in identifying the country's priority issues on chemicals management as well as formulating project proposals for sourcing funds.
- iii. Further, in June 2011, in collaboration with the United Nations institute of training and research (UNITAR), Zambia executed another project, "capacity building in the implementation of the globally harmonized system for classification and labeling of chemicals (GHS)". This programme was aimed at assisting the country meet one of SAICM's key corner stones namely, strengthening knowledge and information.

In addition to these milestones, I would like to inform the workshop that Zambia is also a party to a number of multilateral environmental agreements in general and chemical conventions in particular. Some of the chemical conventions Zambia is party to are; Basel, Stockholm and Rotterdam conventions.

Distinguished ladies and gentlemen, with that background, allow me to turn your attention to the issues of why we are gathered here today, namely nanosafety. The safety of manufactured nano materials and nano technology was formally enlisted on the SAICM agenda at the third international conference on chemicals management (iccm3) in Nairobi, Kenya in September, 2012. This was preceded by intense debate and hard work by a number of concerned scientists and stakeholders from both developed and developing countries. My government participated in the ICCM 3 and negotiated for such issues as nanosafety. The enlisting on the SAICM agenda

was an important milestone due to the fact that it was then globally agreed that manufactured nano materials and nano technology was an emerging issue requiring urgent global action.

Ladies and gentlemen, what are the major reasons why manufactured nano materials and nano technology were listed as an emerging issue requiring urgent action? One of the vital reasons is that there are uncertainties on the safety of such products on human health and the environment. For this reason and in line with the precautionary principle, global action was warranted.

In addition, Zambia like any other developing country is an importer and in turn, a generator of hazardous waste which may contain manufactured nano-materials. Nano-technologies have had wide application in product span in sectors such as foods, cosmetics, household appliances, computers, cellular phones, medicines, textiles, ceramics, construction materials, sports equipment and military weapons. Further, it has been established that most consumers of manufactured nano-materials are unaware of the hazards presented by such products and lack basic information on identification and safe disposal of such products.

Distinguished ladies and gentlemen, despite the many applications and prevalence of nano articles and products, nearly all developing countries and countries with economies in transition have not taken any significant action to safeguard their environment and human health from potential adverse effects associated with nano technology and manufactured nano materials. This technical workshop therefore, affords an opportunity to learn more on nanosafety and to initiate activities on public awareness on nanosafety so as to uphold the right to know for consumers.

In view of the identified challenges, it is imperative that this workshop also critically looks into these issues and comes up with concrete strategies aimed at helping African countries achieve the SAICM goal which states that "by 2020, chemicals will be produced and used in ways that minimize significant adverse impacts on the environment and human health". This goal includes manufactured nanomaterials and nanotechnology.

Distinguished guests, ladies and gentlemen, may I conclude by thanking the Swiss government for their financial support, UNITAR for the technical support and all delegates for devoting time to this important issue of nanosafety. I encourage you that before you leave, explore Zambia

and visit other places of interest, one of which is the, the Victoria Falls in Livingstone, southern province of Zambia.

it is now my privilege and honour to declare this regional workshop on nanosafety, officially opened.

I wish you a fruitful workshop.

APPENDIX III: SPEECH BY GEORGE KARLAGANIS-ON BEHALF OF SWITZERLAND

Your Excellency _____

Distinguished participants, Dear friends

- I am very glad to attend this regional NANO SAFETY WORKSHOP here in Lusaka.
- In the name of the Government of Switzerland, I would like to extend our best thanks to UNITAR for the excellent preparation and organization of this workshop.
- I would also like convey my thanks to Zambia in particular David Kapindula and Maxwell Nkoya, for their efforts to make it possible that this workshop takes place but also for Zambia's leadership and strong engagement in this new and emerging issue: nanotechnology and manufactured nanomaterials.
- Why is sound chemicals and waste management a key priority for Switzerland? Why do we take an active role in international chemicals and waste policy?
- There are several reasons: First, Switzerland has an important and globally active chemical industry. Switzerland is also a leading place in related research for nanotechnology.
- Secondly, Switzerland is the host of the main international bodies and conventions, which are relevant for chemicals and waste management. These institutions are, the secretariats of the Basel Convention, the Rotterdam PIC Convention, the Stockholm POPs Convention, the interim Secretariat of the Minamata Convention, UNEP Chemicals and of SAICM – the Strategic Approach to International Chemicals Management, and of course UNITAR, ILO and the WHO. All of them are headquartered in Switzerland.
- Nanotechnology and nanomaterials are new and emerging topics for the chemicals and waste policy. Switzerland has been very active to push for a sound management of this new issue - domestically but also on the international level.
- We believe that the Strategic Approach to International Chemicals Management SAICM offers a very good platform to continue the dialogue, exchange knowledge and experience, and implement further the cooperative and coordinated activities to address nano at international and regional level in a sustainable manner.
- 2012 at the third international conference on chemicals management ICCM 3 in Nairobi, the SAICM stakeholders agreed to integrate activities related to the sound management of nanotechnology and nanomaterials in its implementation tool – the global plan of action.
- And in December 2014 the preparation meeting of the forth international conference on chemicals management ICCM 4, gave a signal that still further action is needed to ensure sustainable global approach to deal with this emerging issues in an environmentally sound manner. It was given in the form of a draft resolution for the ICCM 4. This resolution was initiated by Switzerland, developed, and supported by a number of African countries.
- We are confident that with this support this resolution will be adopted by the ICCM-4 to be held from 28 September to 2 October 2015 in Geneva.
- This immediate reaction of this international chemicals and waste instrument proves once more that chemicals and waste have been one of the success stories for more than 20 years.

- Then we have concluded important international legal instruments and frameworks with regard to the sound management of hazardous chemicals and wastes. A remarkable recent success was reached at 2013 with the adoption of the Mercury Convention in Geneva.
- This was only possible thanks to the strong engagement of the African region.
- However, much remains to be done. Mercury is only one hazardous chemicals of global concern that requires international measures and actions for the protection of human health and the environment.
- Others such as lead and cadmium but also nanomaterials and EDCs pose challenges and require further international cooperation.
- There are still important challenges to address through effective international cooperation. However, it would not be efficient to develop a new legally binding instrument for each substance or each new emerging issue.
- Therefore, we have to further develop the chemicals and waste regime in a manner that it will be able to address emerging issues in an efficient, effective, coherent and comprehensive manner.
- I would like to express the gratitude and pleasure of my Government to Zambia and the whole African Region which supports this further development of the chemicals and waste regime.
- My government is looking forward to continuing the fruitful cooperation with Zambia and the African Region in this and any other area of the international chemicals and waste management.

Ladies and Gentlemen, I wish you all a productive workshop.

APPENDIX IV: SPEECH BY MR. P. ZULU-ACTING DIRECTOR GENERAL, ZEMA

Honourable Minister of Lands, Natural Resources and Environmental Protection, the Swiss ambassador, Acting Permanent Secretary, Ministry Of Lands, Natural Resources and Environmental Protection, Director in the dept. Of environment and natural resources, Reps from the united nations institute of training and research (UNITAR), International and local experts, Invited workshop participants, Distinguished guests, Members of the press, Ladies and gentlemen. I feel greatly privileged to offer few remarks this morning and I stand here representing the Zambia environmental management agency and the director general. Firstly I wish to welcome you to this important workshop and to our friends coming from outside Zambia, I simply say welcome to Zambia!

We gather this morning, courtesy of the government of the republic of Zambia which supports ZEMA, and the wonderful collaboration efforts always given by UNITAR and with financial support from the government of Switzerland. As ZEMA, we are proud to host this international workshop on nanosafety whose aim is to build capacity on sound management of manufactured nano materials and nanotechnology in general.

Ladies and gentlemen, on the outset, perhaps, it is appropriate to understand what nanotechnology is. I am aware that nanotechnology is that part of science and engineering that involves the study and manipulation of particles, nanometers in size. A nanometer is one billionth of a meter and to put this in context of comparison, i will give an example of a virus. One virus is about 60nm in size! You will appreciate that this is a very small scale dimension. So then you may ask, why get concerned with nanotechnology and its products? Zambia like many other developing countries imports many manufactured products and many such products are as result of applications of nanotechnology which unfortunately, in many instances, contains inherent risks to human health and the environment, and such risks are often not well known.

Dear friends, you will be surprised that many common and most likeable imported products for everyday use such as cosmetics, computers, medicines, sports equipment, cell phones, foodstuffs etc. are part of the product span of nanotechnology. Well, this technical workshop will provide a platform of discussion to provide answers to many questions on nanotechnology and nanomaterials. Why then should we not pay attention to experts present at this workshop to learn more? I therefore urge you to pay attention, and participate fully and with the warm welcome, typical of genuine African hospitality, wish you fruitful discussions, and a pleasant stay in Zambia.

I thank you.

APPENDIX V. IDENTIFIED NEEDS BY GROUP 1

- i. National Policy on NMs is needed. i.e. The legal framework in Africa needs to be developed. National policy needs to encompass guidelines/standards on:
 - a. Regulations regarding import
 - b. Labelling on NMs. GHS labeling decisions can be used to push government. This way the consumer has the choice. However the consumer needs to be educated.
 - c. Waste management:
- ii. Working groups need to be set up within countries. However these don't need to be new groups, nanosafety can be incorporated into existing working groups.
- iii. Capacity needs:
 - a. Personnel/human resources
 - b. Equipment/tools
 - c. Incorporate nano into schools and university curriculum
- iv. Financial mechanisms are needed for research, capacity building etc. Collaborations key to enable research which will provide policy makers with evidence on nanosafety.
- v. Awareness of NMs and nanosafety:
 - a. Public/consumer awareness
 - b. Media education
 - c. Policy makers: necessary to convince people that this is important. A comparison with asbestos history is relevant. This has also been decided by SAICM as this is an emerging issue. In addition, the precautionary principle should be used.
- vi. Political will
- vii. Workplace safety is a priority. Policy will guide/force workplace practices and use of personal protective equipment.

Make use of existing guidelines and knowledge on developing nanotechnology program. We don't need to start from scratch here!

APPENDIX VI. IDENTIFIED NEEDS BY GROUP 2

a. Brainstorming

- ❖ Reflect the situation in home country and extrapolate
- ❖ (Zambia) – Take inventory of the nanomaterials coming into the country, no inventory of hazards nanomaterials
 - Will enable ability as to how to categorize and know how to deal with these materials
 - What is nano?
 - Do we have capacity to do that?
- ❖ (Niger) – Awareness a problem? What is nano technology? Effects on the environment and health. Photovoltaics cells are used a lot and people not aware. Encouraging lighting using fuel. [Use schools to promote awareness

b. Strategy

- ❖ Establish the status of nanomaterials and nanosafety issues at national level
- ❖ Identified three primary needs
 - Expertise
 - Policy, regulatory framework, institutional arrangements
 - Infrastructure
- ❖ Note that these may be different country-to-country in terms of priority

c. Expertise

- ❖ Strengthening institutional capacity (human resource)
- ❖ Policy makers inadequately informed on nanomaterials
 - Must understand what nanomaterials and nanosafety
 - Have an influence in establishment of standards
 - Develop/training technical knowhow (advisory)- A training program can be develop
 - Create expertise that can deal with multi-dimensional products

- ❖ Research, trainers, technicians , campaigners, regulator

d. Policy, regulatory and institutional framework

- ❖ What are the gaps?
- ❖ Examine existing policies – environment, health, energy, legal framework
- ❖ [Note] Country specific issues e.g. Zambia has only one national policy on environment.
Need to fill in the gap if not present.
- ❖ What are the institutional arrangements? How do they coordinate i.e. coordination mechanism?
- ❖ Is there a formalized body for sound chemical management (multi-component)?

e. Infrastructure

- ❖ Research
 - laboratories, equipment etc.
 - Maintenance of infrastructure
 - Carryout national infrastructure audit (infrastructure, equipment, expertise)
- ❖ Laboratories (certified) for analysis/assessment
- ❖ Training

f. Champions

- ❖ Who will trigger interest?
- ❖ Needs assessment?
- ❖ Awareness programs?
- ❖ Bring issues of nano to regional organizations
- ❖ Need to agree on how this becomes Government action
- ❖ Observed that there was not representative from any of the regional organizations
- ❖ Develop proposal for needs national (regional) assessment – regional action plan

APPENDIX VII: WORKSHOP PROGRAMME



unitar

United Nations Institute for Training and Research



BETTER POLICIES FOR BETTER LIVES

Manufactured Nanomaterials/ Nanotechnology Workshop for the African region

Lusaka, Zambia

16&17 April 2015

Agenda

Day 1:

16 April		
08:30	Registration of Participants	Morning Session Chairperson: Mr. Patson Zulu-Zambia
09:00	Opening and Welcome: -ZEMA Director General, -Honorable Minister for Lands, Natural Resources and Environmental Protection	Zambia/UNITAR/OECD
09:30	Inter-governmental work on Chemicals Management: <ul style="list-style-type: none"> • SAICM • BRS • WHO • Nanomaterials Classification and Labelling: Status of work undertaken in GHS 	SAICM Abiola Olanipekun WHO Zambia UNECE
10.00	Environmental NGO's areas of work: NGO Work on Nanosafety Issues	IPEN Africa
10:20	Nanotechnology Governance in Development Countries	Prof. Ndeke Musee

10:40	Coffee Break	
11:00	OECD Work on Chemicals and on Manufactured Nanomaterials	Melissa Vetten, South Africa
11:30	Strengthening National Capacities to Address Nanotechnology and Manufactured Nanomaterials	Mr. Georg Karlaganis UNITAR
12:00	IOMC Toolbox for Decision Making in Chemicals Management	Mr. Georg Karlaganis UNITAR
12:20	Group Discussions	All
12:30	Lunch	
13:30	State of the Art in the African Region: <ul style="list-style-type: none"> • Senegal • Kenya • Zambia • Toxicity and Hazard Assessment of Nanomaterials 	Afternoon Session Chairperson: Dr. Vladimir Murashov -USA Countries Dr. Diagne Magatte, Senegal University Cheikh Anta Diop (UCAD) Dr. Njagi Njomo University of Nairobi Dr. Phenny Mwaanga Copperbelt University Professor Luke Chimuka School of Chemistry, Wits University
14:45	Group Discussions	All
15:00	Coffee Break	
15:15	Occupational, Consumer, and Environmental Exposures of Manufactured Nanomaterials	Dr. Vladimir Murashov NIOSH/UNITAR
15:45	Safe Testing and Risk Assessment of Manufactured Nanomaterials - OECD	Melissa Vetten, South Africa
16:15	Tour de Table: Regional perspective and experiences Chair: Dr. Vladimir Murashov	Ms Carolle Adjovi, Benin Mr. Mahamadou Hamidine, Niger Mr. Mohammed Salim, Sudan Ms Yamelakesira Tamene, Ethiopia Mr. Ismail Abbas, Sudan
16:45	Group Discussions	All
17:00	End of day 1	

17 April

08:30	Welcome Instructions for Working Groups	Morning session Chairperson: Dr. L. Chimuka Mr. Georg Karlaganis UNITAR
08:45	Working Group 1: Identifying the Needs in the African region	All
10:30	Coffee Break	
10:45	Group discussion	All
12:30	Lunch	
13:30	Updates from SAICM's 2 nd Open-ended Working Group: CRP-5 nano resolution	Afternoon Session Chairperson: Dr. Njaji Njomo Mr. Georg Karlaganis UNITAR
13:45	Working Group 2: Prioritising the Needs in the African Region and identifying the Common issues	All
15:00	Coffee Break	
15:15	Plenary discussion	All
16:30	Wrap Up discussion	All
17:00	Closure of Workshop	