

# **CONFERENCE REPORT**

## **5<sup>th</sup> International Conference on Nanoscience and Nanotechnology 2018 (ICNSNT 2018)**

13-14 December 2018

Colombo, Sri Lanka

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Mahenwatte, Pitipana, Homagama

Sri Lanka

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## INTRODUCTION

Nanoscience is a rapidly growing multidisciplinary subject area which has gained a great deal of attention in many fields including biomedical, engineering, industrial, agricultural, environmental, energy and value-addition to natural resources. Nanotechnology is a rapidly growing technology derived from nanoscience when it comes to practical applications scenario. The nanotechnology deals with materials at 1-100 nm size range and at this range, properties of materials show significant differences compared to large sizes of the same material. Therefore there is a huge knowledge gaps to be filled in nanoscience and nanotechnology. As a result scientists are engaged in enormous amount of research and development activities in broad range of research areas of nanoscience and nanotechnology. Therefore The International Institute of Knowledge Management (TIKM) organized International Conference on Nanoscience and Nanotechnology (ICNSNT) since 2014 in order to provide an important platform for international researchers and technologists to communicate their valuable results and outcomes of researches. In 2018 TIKM successfully organized the conference for fifth time at hotel Taj Samudra, Colombo on 13-14<sup>th</sup> December 2018. The hosting partner of the conference was International Islamic University, Malaysia.

Prof. K. M. Nalin de Silva chaired the conference who is one of the leading scientists on nanoscience and nanotechnology in Sri Lanka and a senior professor attached to University of Colombo, Sri Lanka and Sri Lanka Institute of Nanotechnology (SLINTEC). The conference was started with lighting the oil lamp as traditional event with key people followed by national anthem. The managing director of TIKM, Mr. Ishanka P. Gamage delivered the welcome address to welcome all participants and guests. Prof. K. M. Nalin de Silva delivered speech as conference chair and talked about the importance of nanotechnology, its input in development of Sri Lanka and history of nanotechnology in Sri Lanka. He described the importance of the conference and stated that ICNSNT is the only conference in Sri Lanka dedicated to nanoscience and nanotechnology of the country. He also introduced keynote speakers to the audience with their profiles. Conference trailer was launched after Prof. Nalin's speech.

The most interesting and educational keynote speeches were delivered by Prof. Nilanga Liyanage at University of Virginia, USA, Prof. G. R. A. Kumara at National Institute of Fundamental Studies, Sri Lanka and Dr. Gareth Williams at the University College London, UK. Conference photograph was taken after the keynote session. The plenary speech after first two technical sessions was conducted by Prof. Rohini M de Silva at University of Colombo,

Sri Lanka. Details on these key speeches are given in next sections of the report. The conference was comprised of seven technical sessions full of oral presentations of about 31 abstracts under topics as given below and a poster session with 3 poster presentations. Interesting feature of the conference was the workshop conducted by Dr. Gareth Williams on pharmaceutical based research and development. This workshop supported young upcoming scientists in Sri Lanka and international scientists working on pharmaceutical based research activities. The workshop also provided valuable knowledge for scientists new to this area.

- **Technical Session 1:** Nanocatalysts and Nanofabrication
- **Technical Session 2:** Smart textiles and apparels
- **Technical Session 3:** Synthesis and Characterization Techniques of Organic and Inorganic Nanomaterials
- **Technical Session 4:** Nanomaterials in Food, Agriculture, Rubber and Water Purification
- **Technical Session 5:** Nanodevices, Nanosensors, Nanoelectronics and Nanophotonics
- **Technical Session 6:** Nanobiotechnology, Nanomedicine, Nano-drug Delivery Systems and Biopharmaceuticals
- **Technical Session 7:** Nanotechnology for Clean Energy and Environment

At the end of the conference, best presenters were awarded which is very important in encouraging young scientists to continue their good work in the development of nanoscience and nanotechnology. ICNSNT 2018 is a well-organized international conference contributing the development of nanoscience and nanotechnology by providing a platform for upcoming scientists. The conference is an educationally important on awareness of nanotechnology to the world.

## **KEYNOTE SPEECH 1**

**Prof. Nilanga Liyanage, University of Virginia, USA**

Prof. Nilanga delivered his keynote speech on particle accelerators in nanoscience. He shared his knowledge, experience and expertise in particles physics where in his researches he deals with below nanometer scale. He discussed the relationship between particle physics and nanoscience. According to his speech, particle accelerators have played a significant role in most of the fundamental discoveries during past century. Such particle accelerators have supported nanoscience and nanoscale researches by developing powerful tools such as X-ray

light source based imaging techniques for nanometer scale imaging. Furthermore particle accelerators have played a key role in nanofabrication techniques, materials deposition and ion implantation. The speech opened new research areas and ideas for participant multidisciplinary scientists and academics.

## **KEYNOTE SPEECH 2**

**Prof. G. R. A. Kumara, National Institute of Fundamental Studies, Sri Lanka**

Prof. Kumara's speech was very interesting and attention grabbing speech, combined with practical demonstrations. The demonstrations were conducted by two of his PhD students. His speech is on novel research conducted in the area of nanotechnology. He shared his knowledge, experience and research activities on varieties of dye sensitized solar cells (DSCs), super-capacitors and graphite based innovations including novel synthesis routes of graphene, graphene oxide and expandable graphite. Prof. Kumara compared performances of silicon solar cells with DSCs and showed that DSC generates electricity even under low intensity light conditions. DSCs can be fabricated with low cost compared to silicon solar cells. Even natural dyes can be used to manufacture efficient DSCs according to Prof. Kumara's inventions. He has many patents in this area and has established industries in Japan manufacturing large DSCs. He also showed easy manufacturing methods of high performance super-capacitors. He has developed technology on usage of coconut shells to fabricate highly efficient super-capacitors and counter electrode of DSC as a replacement to expensive platinum electrodes. He demonstrated this product and its performance during his speech. Another key area of his interest is graphite based materials for broad range of applications. Sri Lanka is endowed with high purity rare type of vein graphite with large minable quantities. However the value addition to such graphite deposits of Sri Lanka is very limited. Nevertheless Sri Lankan graphite has high potential to be used to synthesize technologically important graphene, expandable graphite and graphene oxide. These materials can be marketed for high costs in order to improve economy of Sri Lanka. Prof. Kumara has invented novel solution based technology to produce high purity graphene from graphite by one-pot electrochemical route. He has patented his processes. All participants enjoyed his speech with practical aspects. Such eminent scientists serving the country are very important and inspiring characters to young upcoming scientists, technologists and researchers. Therefore the effort of ICNSNT to bring such eminent scientists to the stage is highly appreciated.

### **KEYNOTE SPEECH 3**

**Dr. Gareth Williams, University College London, UK**

Dr. Gareth Williams delivered a speech on nanoscale architectures from electrohydrodynamic (EHD) processes and their applications in drug delivery. This area of research is very important on new discoveries on nanomedicines and new drug formulations. In this concept, liquefied polymers in volatile solvents are ejected under high potential electrical energy from a syringe towards a collector. The collector will automatically contain nanofibrous membrane or particles of solid polymer material or mixture of polymers or materials used. He stated that the membrane obtained is similar to string hoppers in Sri Lanka to explain the idea to the audience. Using this method, various medicines can be developed with various drug releasing kinetics. Targeted drug delivery and controlled release are key features of such drug products synthesized by EHD processes. Dr. Williams showed many interesting results and his discoveries on drug delivery systems synthesized using EHD processes he developed. His presentation and speech was very important to researchers in the audience working on drug related studies and nanofibers.

### **PLENARY SPEECH**

**Prof. Rohini M. De Silva, University of Colombo, Sri Lanka**

Prof. Rohini presented her research efforts on water purification by nanomaterials. She has a strong research team located at University of Colombo working on nanomaterials in water purification and drug delivery. In her speech she described all research activities and publications in this area. Currently the world is facing a problem on limiting fresh water for the consumption of human being and all species. Sri Lanka is also facing this problem in many places of the country. The large number of people in the country are suffering from kidney deceases due to consumption of contaminated and polluted water. She has received several research grants for her studies to provide solutions for water purification using nanomaterials. Due to high surface area-to-volume ratio, nanoparticles have gained a great deal of attention in water purification as such nanomaterials can easily adsorb and degrade contaminants. Her aim is to develop filtering materials and later some products to produce fresh water from contaminated water which will provide a huge benefits for Sri Lankans and people in the world having problems to extract fresh water. Therefore the speech was very inspiring one.

## **TECHNICAL SESSION 1**

### **Nanocatalysts and Nanofabrication**

**Chaired by: Dr. W. P. S. L. Wijesinghe, Sri Lanka Institute of Nanotechnology, Sri Lanka**

This session was held on 13<sup>th</sup> December 2018 at Longdon room of the hotel from 14.10 to 15.50. The session was dedicated to nanocatalysts and nanofabrication methods. First paper of this session was titled structural and optical properties of CuO/ZnO composite nanostructures which was presented by A. Agarwal at the Department of Physics, Motilal Nehru National Institute of Technology, India. The authors have synthesized CuO/ZnO bioxide nanostructures with crystallite size of 26 nm at low temperature. They reported that the bandgap of the final composite material is 2.86 eV and this is a significant change in photoluminescent spectrum. The second presentation is on carbon quantum dots decorated magnesium oxide nanoparticles as a photocatalyst and antibacterial agent which was presented by M.M.M.G.P.G. Mantilaka from Sri Lanka Institute of Nanotechnology, Sri Lanka. In this work the authors reported a new material prepared by adsorbing carbon quantum dots on magnesium oxide nanoparticles. This materials has sunlight active photocatalysis and antimicrobial properties. Therefore the authors proposed that the materials they synthesized is suitable for environmental pollution control applications. Third presentation of the session was presented by R. M. D. M. Senarathna from University of Sri Jayawardenepura, Sri Lanka. The title of the paper was replication of the surface wettability of plant leaves with different surface morphologies using soft lithography. In this study authors have mimicked surface nano/micro architectures of five plant species with different surface morphologies by soft template method. They have successfully made those natural nano-structures artificially using polydimethylsiloxane by soft-template route. The next paper is on oxidation protection of carbon fibre by  $Zr_3(PO_4)_4/YPO_4-B_2O_3$  composite nanocoatings which was presented by K. Purasinhala at Sri Lanka Institute of Nanotechnology, Sri Lanka. In this work authors claimed that usage of carbon fibres has hindered due to their poor thermal stability at high temperature. As a solution for this problem, the authors have developed a surface nanocoating on carbon fibres using  $Zr_3(PO_4)_4/YPO_4-B_2O_3$  composite. After applying this nanocoating, the carbon fibres are stable even at 900 °C. The last presentation of this session is on comparison of properties of iron doped zinc oxide nanoparticles fabricated by microwave method and precipitation method

which was presented by P. Hari at University of Tulsa, Oklahoma, USA. Herein, the authors have synthesized iron doped zinc oxide nanoparticles by precipitation and microwave assisted methods. Then they have studied and compared structural, optical, magnetic and electrical properties of the material synthesized using both routes. Authors concluded that microwave method is more efficient in synthesis of iron doped zinc oxide nanoparticles with tunable properties.

## **TECHNICAL SESSION 2**

### **Smart Textiles and Apparels**

**Chaired by: Dr. B. Mythili Gnanamangai, K.S. Rangasamy College of Technology,  
India**

This session was held on 13<sup>th</sup> December 2018 at Regency room of the hotel from 14.10 to 15.30. Smart textiles and apparels is one of interesting areas of nanotechnology when it comes to real life applications. In this session, research and development activities on smart textiles were presented. The first paper of the session was presented by S. Manjula at Kongu Arts and Science College, Tamilnadu, India which is on plasma modified textile treated with plant mediated silver nanoparticles for biomedical applications. The authors have synthesized silver nanoparticles using a plant known as *Tridax procumbens* via a biological synthesis route. The authors have made an antimicrobial fabric by plasma treatment on textiles to attach synthesized silver nanoparticles. The next presentation was on preparation of protein based fluorescence dye from wool keratin protein which was presented by H. D. Rajapakse at Department of Materials Science and Engineering, University of Moratuwa, Sri Lanka. In this study, authors have synthesized carbon quantum dots based fluorescent dye using wool fibres to use in broad range of applications. The third presentation of the session is titled thermal responsive smart yarn integrated wearable textiles which was presented by N. D. Tissera at Sri Lanka Institute of Nanotechnology, Sri Lanka. In this work, authors reported a thermal responsive yarn that they fabricated using nylon mono filament material. This yarn has a capability to change its dimension gradually according to the change of external environment temperature. The application of this interesting yarn is heat regulation of body. The final presentation of the session was conducted by P.V.T. Weerasinghe from Sri Lanka Institute of Nanotechnology, Sri Lanka which was on electroless silver plating on premetallized polyamide

fibres for smart textile applications. Herein, authors have synthesized a conductive yarn by growing silver nanoparticles on nylon yarn which is useful for smart wearable electronics.

### **TECHNICAL SESSION 3**

#### **Synthesis and Characterization Techniques of Organic and Inorganic Nanomaterials**

**Chaired by: Dr. Lahiru Wijenayake, Sri Lanka Institute of Nanotechnology, Sri Lanka**

This session was held on 14<sup>th</sup> December 2018 at Longdon room of the hotel from 9.00 to 10.20. This session is dedicated to synthesis and characterization techniques of organic and inorganic nanomaterials which is one of fundamental areas of nanotechnology. The session was started with the paper on synthesis and characterization of sequence-defined poly(phosphodiester)s which was presented by D. N. A. A. Arachchige at University of Kent, UK. According to the author, the control of monomer sequence in synthetic polymers is key to organic materials chemistry. In the study, the author has studied poly(phosphoester)s in terms molecular recognition of intracellular drug delivery. The second presentation of the session was conducted by S. Ahmed at the University of Haripur, Pakistan, titled synthesis and structural characterization of mononuclear zinc complex for deposition of ZnO thin-films by AACVD. In this work the authors have studied mono-nuclear  $[Zn(OAc)_2(dmae)_2]$  complex and its deposition into a zinc oxide thin-film by aerosol-assisted chemical vapour deposition technique. According to authors, this film is suitable for photoelectrochemical applications. The third presentation of the session was on synthesis of calcium carbonate microcapsules as novel self-healing containers which was presented by N. M. Hettiarachchi at Sri Lanka Institute of Nanotechnology, Sri Lanka. Herein authors have developed self-healing epoxy composites coatings using calcium carbonate microcapsules. The final presentation of the session was presented by B.M. Gnanamangai at K. S. Rangasamy College of Technology, India. In this work the authors have synthesized zinc oxide nanoparticles using actinomycetes isolated from the rhizosphere of the soil.

## **TECHNICAL SESSION 4**

### **Nanomaterials in Food, Agriculture, Rubber and Water Purification**

**Chaired by: Dr. Parameswar Hari, University of Tulsa, USA**

This session was held on 14<sup>th</sup> December 2018 at Regency room of the hotel from 9.00 to 10.20. This session is focused on application of nanomaterials in food, agriculture, rubber and water purification. The first presentation of the session was conducted by J.M.A.R.B. Jayasinghe from department of chemistry, University of Colombo, Sri Lanka which is titled enhancement of ultimate tensile strength of natural rubber composites via titanium carbide nanoparticles. In this work, authors have significantly enhanced mechanical properties of natural rubber using titanium carbide nanoparticles. The second presentation of the session was on an overview of use of biodegradable and non-biodegradable nanoparticles in different industries which was presented by B. K. A. Bellanthudawa at Faculty of Engineering and Management, Ocean University of Sri Lanka. This paper was a review on existing knowledge on biodegradable and non-biodegradable nanoparticles. The presenter concluded that effective monitoring programmes should be adopted and existing knowledge gap should be addressed. The third presentation of the session was on synthesis of electrospun hydroxyapatite zinc oxide nanorods and their photocatalytic activity on methylene blue degradation which was presented by N. P. Edirisinghe at Sri Lanka Institute of Nanotechnology, Sri Lanka. Herein, authors have synthesized hydroxyapatite/zinc oxide nanocomposite rods. This materials has photocatalytic activity and has capability to degrade dye molecules under UV radiation for water purification applications. The final paper of the session was presented by M. S. Fernando at University of Colombo, Sri Lanka which was titled hydroxyapatite based nanocomposites with biopolymers and granular activate carbon to remove different types of contaminants from water. In this study, the authors have developed various adsorbents by incorporating hydroxyapatite nanoparticles into biopolymers such as chitosan, carboxymethylcellulose, alginate, and gelatine. These composites are capable of treating contaminated water to produce fresh water.

## **TECHNICAL SESSION 5**

### **Nanodevices, Nanosensors Nanoelectronics and Nanophotonics**

**Chaired by: Dr. Kumudu Siriwardhane, Sri Lanka Institute of Nanotechnology,  
Sri Lanka**

This session was held on 14<sup>th</sup> December 2018 at Longdon room of the hotel from 11.10 to 12.50. This session is dedicated to one of interesting areas of nanotechnology which deals with nano-devices, nanosensors, nanoelectronic materials and nanophotonics. These topics are advanced and have many applications. The first presentation of the session was conducted by R. N. Wijesena at Sri Lanka Institute of Nanotechnology. The paper was titled micro sized graphite based conductive ink for capacitive based e-paper devices. The authors have developed an interesting ink using graphite which has capability to connect to internet in order to read e papers. This finding is useful in development of smart papers and textiles. The next presentation is on fabrication and characterization of poly(vinyl alcohol) based fast responding and high sensitive humidity sensor which was presented by T. S. E. F. Karunarathne at Sri Lanka Institute of Nanotechnology, Sri Lanka. In this research work, authors have fabricated a humidity sensor using poly(vinyl alcohol). The sensor has a high humidity sensing effect. The third presentation of the session was titled a bacterial biosensor, struggle in the laboratory to enter to the market; a potential candidate in nano-photonics applications which was presented by H.M.L.P.B. Herath at University of Colombo, Sri Lanka. In this work authors have developed an interesting sensor to detect heavy metals in contaminated water using genetically engineered heavy metal sensitive bacterial strain which has capability to emit fluorescence signals when it is contacted with heavy metals. The final paper of the session was presented by S. Ullah at Universidade de Sao Paulo, Brazil which was titled spin coherence of two-dimensional electron gases confined in multilayered structures. Herein, authors reported the generation of spin dynamics in GaAs quantum wells containing two dimensional electron gas. This research work has applications in electronic devices.

## TECHNICAL SESSION 6

### Nanobiotechnology, Nanomedicine, Nano-Drug Delivery Systems and Biopharmaceuticals

**Chaired by: Dr. Parameswar Hari, University of Tulsa, USA**

This session was held on 14<sup>th</sup> December 2018 at Regency room of the hotel from 11.10 to 12.50. The session was dedicated to nanomedicine based researches which is another core area of nanotechnology. The first presentation of the session was conducted by W.R.A.P.J. Ratnayake at University of Peradeniya, Sri Lanka under the topic cellulose based polymeric systems for state-of-the-art drug delivery. In this work, authors have systematically investigated a drug delivery system prepared by bacterial nanocellulose hydrogel and a model protein drug bovine serum albumin (BSA). The authors concluded that synthesized biopolymer is suitable for protein drug delivery. The second presentation of the session was conducted by D. M. M. H. Dahanayake from University of Peradeniya, Sri Lanka which is on synthesis and characterization of antigen-functionalized nanoparticles for immunodiagnosis of anti-leptospiral antibodies using UV-visible spectroscopy. This work reported stability of antigen-functionalized silver nanoparticles of 80 nm at optimum environmental conditions for the identification of antibodies against leptospirosis. The next presentation is on super antibacterial properties of titanate species in dark conditions which was presented by N. D. Wickramasinghe at University of Colombo, Sri Lanka. In this research, authors showed that meta titanate and potassium titanate are excellent antimicrobial agent than antimicrobial drug, Gentamycin. The fourth presentation of the session was on electrospun nanofibers loaded with ZnO as antibacterial wound dressing materials which was presented by V. U. Godakanda at University of Colombo, Sri Lanka. Herein, authors have fabricated a wound dressing material by incorporating zinc oxide nanoparticles on electrospun polyvinylpyrrolidone/ethyl cellulose nanofibrous mats. The final presentation of the session was conducted by T. S. P. Kankanamge at Sri Lanka Institute of Nanotechnology, Sri Lanka which is on insight of silver chitin nanoparticle interaction. In this work, authors have studied interactions between silver nanoparticles and chitin nanoparticles synthesized from crab shells by a facile method.

## **TECHNICAL SESSION 7**

### **Nanotechnology for Clean Energy and Environment**

**Chaired by: Dr. Prasanga Mantilaka, Sri Lanka Institute of Nanotechnology, Sri Lanka**

This session was held on 14<sup>th</sup> December 2018 at Longdon room of the hotel from 13.50 to 15.30. This was the final technical session of the conference. The first paper of the session was presented by K.D.M.S.P.K. Kumarasinghe at National Institute of Fundamental Studies, Sri Lanka which is on performance improvement of dye-sensitized solar cells by mgo surface modification on nanoporous TiO<sub>2</sub> photoanode. In this study, authors have fabricated a dye sensitised solar cell using MgO coated naoporous TiO<sub>2</sub>. The solar cell presented is low cost and showed high performances. The next presenter of the session was H. Joshi at University of Delhi, India. Her presentation is on tuning optical properties in nanocomposites which is a theoretical study on optical properties of silver and gold nanoparticles with their composites. The third paper of the session was titled PEG and chitin nanofibers composite for smart windows with tunable transparency which was presented by V. W. S. G. Rathnayaka at University of Moratuwa, Sri Lanka. In this work, authors have developed chitin nanofibers incorporated polyethylene glycol composite material which acts as a smart transparent window. The fourth presentation of the session was conducted by A. K. D. V. K. Wimalasiri at University of Colombo, Sri Lanka which was titled rapid water decontamination using hydroxyapatite – ceria nanohybrids. This work reported a hydroxyapatite ceria nanocomposite material which has capability to remove lead, arsenate and fluoride ions from contaminated water. The final presentation of the session as well as in the conference was conducted by I. W. Siriwardane at Sri Lanka Institute of Nanotechnology, Sri Lanka. The title of the paper was thermally stabilized nanomagnetite and nanotitania doped polyacrylonitrile nanofibers for simultaneous removal of As(V) and Cd(II) in water. Herein, authors have synthesized magnetite nanoparticles incorporated polyacrylonitrile nanofibers by electrospinning process to use in removal of arsenic and cadmium heavy metal ions in contaminated and industrial effluents.

## **POSTER SESSION**

Poster session was held on 13<sup>th</sup> December 2018 at Regency room of the hotel from 16.10 to 16.30. Three posters were displayed and presented to audience during this session. P.V.T. Weerasinghe at Sri Lanka Institute of Nanotechnology, Sri Lanka presented a poster titled interpenetrative PEG/chitoson polymer thin films for smart textile applications: study shape memory responsiveness for moisture. In this poster the authors showed polyethylene glycol/chitosan composite thin-films on textile surfaces to produce shape memory moisture management textile material. A. Rani from University of Auckland, New Zealand displayed her poster on peptide directed self-assembly of organic semiconductors for biocompatible electronics. This study presented preliminary work on self-assembly behaviour of protein to protein interactions for applications in organic semiconductors. S. Ullah presented his poster on multiperiodic spin precessions of the optically-induced spin polarization in  $Al_xGa_{1-x}As/AlAs$  single quantum well. This work was a theoretical based research on quantum well.

## **CONFERENCE WORKSHOP**

Conference workshop was held on 13<sup>th</sup> December 2018 at Longdon room of the hotel from 16.30 to 18.00. The workshop was conducted by Dr. Gareth Williams on pharmaceutical based research and development. This was conducted as a discussion rather than just conducting some lectures. This is an interesting feature of the workshop as it made participants to get more understanding and involvement. The workshop provided important details and experience for researchers working on pharmaceuticals and nanomedicine fields.

## **CONFERENCE CLOSURE AND AWARD CEREMONY**

Closure of the 5<sup>th</sup> international conference on nanoscience and nanotechnology was marked with closing remarks by the conference chair Prof. K. M. Nalin de Silva, Senior professor at University of Colombo and Science Team Leader at Sri Lanka Institute of Nanotechnology, Sri Lanka on 14<sup>th</sup> December 2018 at Longdon room of the hotel. The best performers of the conference were awarded at the closing ceremony of the conference. Also, session chairs and evaluators were appreciated by awarding tokens of appreciations.

## **Session Best Awards**

**SYNTHESIS AND CHARACTERIZATION TECHNIQUES OF ORGANIC AND INORGANIC NANO MATERIALS:** D.N.A. Appukutti Arachchige (University of Kent, United Kingdom)

**NANOBIOTECHNOLOGY NANOMEDICINE, NANO DRUG DELIVERY SYSTEMS AND BIOPHARMACEUTICALS :** V. Umayangana Godakanda (University of Colombo, Sri Lanka)

**NANOTECHNOLOGY FOR CLEAN ENERGY AND ENVIRONMENT:** I.W. Siriwardane, University of Colombo, Sri Lanka.

**NANO CATALYSTS AND NANO FABRICATION:** K. Purasinhala, Sri Lanka Institute of Nanotechnology, Sri Lanka

**NANOBIOTECHNOLOGY NANOMEDICINE, NANO DRUG DELIVERY SYSTEMS AND BIOPHARMACEUTICALS:** T. S. Pituwala Kankanamge (Sri Lanka Institute of Nanotechnology, Sri Lanka)

**NANODEVICES, NANOSENSORS NANO ELECTRONICS AND NANOPHOTONICS:** Ruchira N. Wijesena (Sri Lanka Institute of Nanotechnology, Sri Lanka)

### **Overall Best Presentation:**

**D. N. A. Appukutti Arachchige (University of Kent, United Kingdom)**

### **Student Best Presentation:**

**V. Umayangana Godakanda (University of Colombo, Sri Lanka)**

### **Best Poster Presentation:**

**P.V.T. Weerasinghe (Sri Lanka Institute of Nanotechnology, Sri Lanka)**