



# Chanaka Sandaruwan

<http://scholar.google.com/citations?user=QUrPRLEAAAAJ&hl=en>

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## RESEARCH EXPERIENCES

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**Research scientist (August, 2010 – Present- Sri Lanka Institute of Nanotechnology  
([www.slintec.lk](http://www.slintec.lk))**

### **Development of slow/controlled release nano-fertilizers**

Implementation of nanotechnology in the development of future generation, smart and controlled release nano-fertilizers, which release the nutrients on demand in a slow and sustained manner (Publication number: US8696784 B2, US20140165683 A1).

### **Development of an environmentally friendly NPK test kit to determine major nutrient in soil**

An environmentally friendly NPK test kit will be produced in order to determine major nutrient in soil and will be tested in multiple locations in Sri Lanka to assess the efficacy of the test kit.

### **Synthesis of Anti-diabetic and Anti-oxidant carbonated drink**

Hot water extraction of *Cinnamomum zeylanicum* (Ceylon cinnamon) was tested for evaluate anti-diabetic properties using  $\alpha$ -amylase and  $\alpha$ -glucosidase enzyme inhibitory assays. Anti-oxidant properties were analyzed using DPPH radical scavenging assay. Consumable tablet was formulated using cinnamon hot water extract for making carbonated drink. Animal trials (Rat model) has been concluded.

### **Development of a phosphate fertilizer from Sri Lankan Rock Phosphate**

Liquid or solid phosphate fertilizer is being developed from local rock phosphate deposit to get a value added product to save money in the country by stopping export raw rock phosphate and importing liquid and solid phosphate fertilizers. This would be a huge achievement in Sri Lankan economy. Extraction parameters from Eppawala rock has been established and final product in liquid and dry form has been developed.

### **Encapsulation of Nanoparticles in a Layered Material (Montmorillonite clay and Layered double hydroxide)/Cellulose Matrices to be used in Agricultural Applications**

Development of nanoparticles encapsulated hybrids using layered materials and cellulose matrices such as wood chips of *Gliricidia sepium* which can be used in agricultural applications.

### **Synthesis of Ag Nanoparticle/Mg-Al-Layered Double Hydroxide Nanohybrids**

Silver nanoparticles were encapsulated with Layered Double Hydroxide making nanohybrids which can be used in anti-microbial applications.

### **Layered materials for water retention for the survival of plants in drought seasons**

Layered clay materials have been enriched using plant nutrients in order to provide required amount of nutrients and water that is needed for the survival of plants in drought seasons.

### **Engineering of nanoscopic materials for water treatment**

Engineering of nanoscopic materials with the potentials of contaminant detection, water purification and prevention of further pollution. Due to the large surface area to volume ratio compared to the bulk, nano engineered materials and devices are effective and efficient in the treat of wastewater contaminated with toxic metal ions ( $\text{Cd}^{2+}$ ,  $\text{As}^{3+}$ ,  $\text{Pb}^{2+}$ ), organic and inorganic solutes and microorganism. Research has been concluded and under publication process.

## Post graduate student (April, 2013 – December, 2014)

- University of Colombo ([www.cmb.ac.lk](http://www.cmb.ac.lk))

### Development of a gas sensor using conducting polymers and metal nanoparticles

In this project attention has been given to construct Palladium nanoparticle incorporated polyaniline film hybrids to detect hydrogen and moisture. Fabricated sensors were used to determine hydrogen and humidity sensing properties. The sensors were calibrated for hydrogen by exposing them to controlled hydrogen flows and for humidity, by exposing them to controlled humidity environments and by measuring impedance. According to the results obtained, polyaniline films exhibited a decrement of impedance in the presence of humidity and the response was significantly improved once Palladium nanoparticles were incorporated. Interestingly, polyaniline films did not respond to hydrogen. Nevertheless, Palladium nanoparticle incorporated Polyaniline films responded to hydrogen.

## PATENTS, PUBLICATIONS and PROCEEDINGS

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- Nilwala Kottegoda, Chanaka Sandaruwan, Gayan Priyadarshana, Asitha Siriwardhana, Upendra A. Rathnayake, Danushka Madushanka Berugoda Arachchige, Asurusinghe R. Kumarasinghe, Damayanthi Dahanayake, Veranja Karunaratne, Gehan A. J. Amaratunga, "Urea-Hydroxyapatite Nanohybrids for Slow Release of Nitrogen", *ACS Nano* (In press)
- N. Kottegoda, D. A. S. Siriwardhana, W. M. G. I. Priyadarshana, C. Sandaruwan, D. A. D. Madushanka, U. A. Rathnayake, S. Gunasekara, D. Dahanayake, A. DeAlwis and A. Kumarasinghe in *Compositions and methods for sustained release of agricultural macronutrients*, Vol. Google Patents, 2014. (Publication number: US20140165683 A1)
- N. Kottegoda, G. Priyadarshana, C. Sandaruwan, D. Dahanayake, S. Gunasekara, A. J. G. Amaratunga and V. Karunaratne in *Composition and method for sustained release of agricultural macronutrients*, Vol. Google Patents, 2014. (Publication number: US8696784 B2)
- G. P. Gunaratne, N. Kottegoda, N. Madusanka, I. Munaweera, C. Sandaruwan, W. M. G. I. Priyadarshana, A. Siriwardhana, B. A. D. Madhusanka, U. A. Rathnayake, V. Karunaratne, "Two New Plant Nutrient Nanocomposites Based on Urea Coated Hydroxyapatite: Efficacy and Plant Uptake", *The Indian Journal of Agricultural Sciences*, 2016, 86 (4), 494-499.
- N. Kottegoda, P. Piyumi, C. Sandaruwan, N. Madusanka, V. Karunaratne, "Urea-Layered Material Nanohybrid Structures for Slow Release of Nitrogen", *Nanoscience & Nanotechnology-Asia*, 2014, 4(2), 94.
- N. Madusanka, C. Sandaruwan, N. Kottegoda and V. Karunaratne, "Synthesis of Ag Nanoparticle/Mg-Al-Layered Double Hydroxide Nanohybrids", *Eur. Int. J. of App, Sci, & Tech*, 2014, 1 (1), 1-7.
- Chanaka Sandaruwan, T. S. E. F. Karunaratne, H. M. P. C. K. Herath, G. A. J. Amaratunga, D. P. Dissanayake, "Polyaniline/Palladium nanoparticle hybrids for moisture and hydrogen detection", 3<sup>rd</sup> International Conference on Nanoscience and Nanotechnology, 2016.

- D. E. Prematunga, C. Sandaruwan and U. N. Ratnayake, "Effect of stearic acid coated coconut shell powder on vulcanization and mechanical properties of natural rubber composites", International symposium on polymer science and technology, 2012, 40.
- N. Kottegoda, I. Munaweera, N. Madusanka, C. Sandaruwan, D. Sirisena, N. Dissanayake, M. Ismail, A. DeAlwis, V. Karunaratne, "Plant nutrient nanoparticles encapsulated cellulose matrix for slow and sustained release of nitrogen", National Nanotechnology Conference, Colombo, Sri Lanka, 2012, 95-97.

## SKILLS AND TECHNIQUES

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### Extensive experience in advanced nanocharacterization techniques:

- Transmission Electron Microscopy (TEM) and Electron Energy Loss Spectroscopy (EELS)
- Scanning Electron Microscopy (SEM)
- Atomic Force Microscopy (AFM)
- Inductively Coupled Plasma Mass Spectrometry (ICP-MS)
- CHNS analyzer
- BET Surface Area Analysis
- X-ray Diffraction analysis (XRD)
- Fourier transform infrared spectroscopy (FT-IR)
- Particle Size Analysis (Nano and Micro)
- Atomic Absorption Spectroscopy (AAS)
- UV/Vis/ NIR Spectroscopy
- Raman Spectroscopy
- Thermal Gravimetric Analysis (TGA)
- Differential Scanning Calorimetry (DSC)
- Optical Microscopy
- Nuclear Magnetic Resonance (NMR)
- LC-MS
- GC-MS

### Expertise in:

- Dynamic Mechanical Analyzer (DMA)
- Fluorometer
- Tensiometer
- Microwave Digester
- Flame Photometer
- Rheometer
- Viscometer
- Sunsimulator
- Densometer
- Planetary Micro Mill
- Kjeldhal Apparatus
- Microtome
- Nanogrinder

## **EDUCATION**

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M.Sc. in Analytical Chemistry (2014) from University of Colombo, Sri Lanka.

B.Sc. in Molecular Biology (2009) from University of Colombo, Sri Lanka.

Professional Graduate Diploma in Computer Science (Equivalent to B.Sc. in Computer Science) (2008) from British Computer Society, United Kingdom.

MBA from Open University Sri Lanka (Reading)

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## REFEREES

**Prof. Veranja Karunaratne (FRSC, FNASSL)**

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