



## Dr. CHINTHAN HEMAPA MANORATNE

Senior Research Scientist  
Materials Technology Section

### Qualifications

**Ph.D.** - Materials Science (University of Colombo, 2017)

**M. Phil.**- Nanocomposites (University of Peradeniya, 2005)

**B.Sc.** -Chemistry, Computer ( University of Rajarata, 2001)

**Advanced Training**- Organic Materials/Inorganic Materials & Metals (Osaka Municipal Technical Research Institute (OMTRI, Japan, 2006)

**Research Fellowship**- Nanotechnology (Birla Institute of Technology and Science (BITS), Pilani, GOA Campus, India, 2009)

**Application training on X-Ray Diffractometer**-( Rigaku Corporation, Japan, 2014)

**Production Engineering Technology for Improving Manufacturing Productivity and Efficiency**-( Kyungshung University, Korea, 2016)

**Development and Application of Solar Technologies and Products**- (Kunming University of Science and Technology (KUST, China, 2017)

**WAITRO Capacity Building Programme on Solar Thermal Technology for Industrial Application** (SIRIM Berhad, Shah Alam, Selangor, Malaysia, 2019)

### Contacts

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### Research Experience

Over 18 years research experiences specialized in the areas related to chemistry, nanotechnology, advanced materials, ceramics, organic/inorganic nanocomposites, semiconductor materials (dye-sanitized PV cell), graphene based nano-materials for the application in rechargeable batteries, etc. Authored and co-authored research publications, communications in internationally recognized journals, international symposiums and contributed to four local patents.

### Interest Areas

Materials science and engineering, application of advanced materials and nanotechnology, advanced instrumentation in materials characterization etc.

### Publications

#### INTERNATIONAL RESEARCH PUBLICATIONS

1. D.T. Rathnayake, K.S.P. Karunadasa, A.S.K. Wijekoon, C.H. Manoratne, R.M. Gamini Rajapakse, H.M.T.G.A. Pitawala. 2023. Polyaniline-conjugated graphite–montmorillonite composite electrode prepared by in situ electropolymerization for supercapacitor applications, *Chemical Papers*, <https://doi.org/10.1007/s11696-022-02646-7>.
2. D. T. Rathnayake, **Kohobhange S. P. Karunadasa**, A.S.K. Wijekoon, C.H. Manoratne, R.M.G. Rajapakse. 2022. Low-cost ternary composite of graphite, kaolinite and cement as a potential working electrode for general electrochemical applications. *Chem. Pap.* <http://doi.org/10.1007/s11696-022-02314-w>

3. Kohobhange S.P.Karunadasa, **C.H.Manoratne**, Microstructural view of anatase to rutile phase transformation examined by in-situ high-temperature X-ray powder diffraction. *Journal of Solid State Chemistry*. 314 (2022) 123377.
4. Kohobhange S.P.Karunadasa, Dananjali Rathnayake, **Chinthan Manoratne**, Amarasooriya Pitawala, Gamini Rajapakse, A binder-free composite of graphite and kaolinite as a stable working electrode for general electrochemical applications. *Journal of Electrochemical Science Advances*. (2021)1-13
5. Kohobhange S.P.Karunadasa, **C.H. Manoratne**, H.M.T.G.A. Pitawala, R.M.G. Rajapakse, A potential working electrode based on graphite and montmorillonite for electrochemical applications in both aqueous and molten salt electrolytes. *Electrochemistry Communications*. 108(2019) 106562.
6. Kohobhange S.P. Karunadasa, **C.H. Manoratne**, H.M.T.G.A. Pitawala, R.M.G. Rajapakse, Thermal decomposition of calcium carbonate (calcite polymorph) as examined by in-situ high-temperature X-ray powder diffraction. *Journal of Physics and Chemistry of Solids*.134 (2019) 21-28
7. S.P.K. Kohobhange, **C.H. Manoratne**, H.M.T.G.A. Pitawala, R.M.G. Rajapakse, The effect of prolonged milling time on comminution of quartz. *Powder Technology*. 330 (2018) 266-274.
8. Kohobhange S.P. Karunadasa, **C.H. Manoratne**, H.M.T.G.A. Pitawala, R.M.G. Rajapakse, The composition, unit cell parameters and microstructure of quartz during phase transformation from  $\alpha$  to  $\beta$  as examined by in-situ high-temperature X-ray powder diffraction. *Journal of Physics and Chemistry of Solids*. 117 (2018) 131–138.
9. Kohobhange S.P. Karunadasa, **C.H. Manoratne**, H.M.T.G.A. Pitawala, R.M.G. Rajapakse, Relative stability of hydrated/anhydrous products of calcium chloride during complete dehydration as examined by high-temperature X-ray powder diffraction. *Journal of Physics and Chemistry of Solids*. 120 (2018) 167–172.
10. **C. H. Manoratne**, S.R.D.Rosa, I.R.M. Kottegoda, 2017. XRD-HTA, UV Visible, FTIR and SEM interpretation of reduced graphene oxide synthesized from high purity vein graphite. *Materials Science Research India*. 14(1): 19-30.
11. Iresha R.M. Kottegoda, Xuanwen Gao, Liyanage D.C. Nayanajith, **Chinthan H. Manorathne**, Jun Wang, Jia-Zhao Wang, Hua-Kun Liu, Yossef Gofer, 2015. Comparison of Few-layer Graphene Prepared from Natural Graphite through Fast Synthesis Approach. *J.Material Science & Technol*. 31: 907–912.
12. Bhanudas Naika, **Chinthan H. Manoratne**, Akash Chandrashekhara, Abhishek Iyera, V. S. Prasad, and N. N. Ghosha, 2012. Preparation of TiO<sub>2</sub>, Ag doped TiO<sub>2</sub> nanoparticle and TiO<sub>2</sub>-SBA-15 nano composites using simple aqueous solution based chemical method and study of their photocatalytical activity. *J. Experimental Nano Science*. 462-479.
13. **C. H. Manoratne**, R. M. G. Rajapakse, M. A. K. L. Dissanayake, 2006. Ionic Conductivity of Poly(ethylene oxide) (PEO)-Montmorillonite (MMT) Nanocomposites Prepared by Intercalation from Aqueous Medium. *Int. J. Electrochem. Sci.*, 1: 32-46.
14. **C. H. Manoratne**, R. M. G. Rajapakse, M. A. K. L. Dissanayake, W.M.A.T. Bandara, D.T.B. Tennakoon, 2006. Montmorillonite as a Conductive Enhancer in (PEO)<sub>9</sub>LiCF<sub>3</sub>SO<sub>3</sub> Polymer Electrolyte. *Solid state Ionics: Advanced Materials for Emerging Technologies*, Proceedings of the Asian Conference, 10<sup>th</sup>, Kandy, Sri Lanka, June 12-16, 543-565.

#### INTERNATIONAL COMMUNICATIONS

1. D.T. Rathnayake, L.W.N. Tharangani, K.S.P. Karunadasa, **C.H.Manoratne** 2019. Mechanically Compressed Graphite-clay Composite Electrode for High-Temperature Application. International Research Conference of Uva Wellassa University, Sri Lanka, 2019 February.
2. L.W.N. Tharangani, D.T. Rathnayake, K.S.P. Karunadasa, **C.H.Manoratne** 2019. The Incorporation of Layered Type Clay in Graphite-Clay Based Electrodes as a Property Enhancement for High-Temperature Applications. International Research Conference of Uva Wellassa University, Sri Lanka, 2019 February.
3. M. G. G. C. Mahanama, Kohobhange S. P. Karunadasa, **C. H. Manoratne** 2018. A composite electrode for high-temperature applications as a value addition to local graphite and kaolinite. South Asia Conference on Multidisciplinary Research (SAMR'18), Colombo, Sri Lanka, 2018 October.
4. Kohobhange, Karunadasa; **Chinthan, Manoratne**; Herath, Pitawala; Gamini, Rajapakse. Dehydration of calcium chloride as examined by high-temperature X-ray powder diffraction. Third Asia-pacific Multidisciplinary Research 2018 June.
5. Karunadasa, K. S. P., **Manoratne, C. H.**, Pitawala, H. M. T. G. A., Rajapakse, R. M. G., 2017. The phase transformation of quartz from  $\alpha$  to  $\beta$  as examined by in-situ high temperature X-ray diffraction, Asia-Pacific Conference on Multidisciplinary Research, 2, 49.
6. **C.H.Manoratne**, L.D.C.Nayanajith, I.R.M.Kottegoda 2012. Synthesis and Characterization of Graphite Composites for Application in Lithium ion Batteries and in Solar Cells, International Conference on Chemical Sciences Institute of Chemistry, Sri Lanka, 2012 June .**WON THE BEST FIVE AWARD.**
7. **C.H.Manoratne**, L.D.C. Nayanajith and I.R.M. Kottegoda 2012. Synthesis and Characterization of Graphene Oxide as a Value Addition to Natural Graphite in Sri Lanka. International conference on Chemical Sciences, Role of Chemistry Research on National Development.

#### LOCAL PUBLICATION/COMMUNICATIONS/ABSTRACTS

- M. G. G. C. Mahanama, Kohobhange. S. P. Karunadasa, **C.H. Manoratne** 2018. A composite electrode for high-temperature applications as a value addition to local Graphite and Kaolinite, Wayamba University International Conference 2018.
- **C.H.Manoratne**, I.R.M.Kottegoda, S.R.D.Rosa 2014. Thermal characterization of graphite, graphite-oxide and graphene by thermogravimetric analysis (TGA/DTA), and Optimization of conversion temperature of graphite-oxide to graphene by HTA/XRD. symposium 2014.
- **C.H.Manoratne**, I.R.M.Kottegod, S.R.D.Rosa, V.P.S.Perera 2014. Optimization of temperature in Graphene (Gn) synthesis process and a simple Preparation of Graphite-oxide/Nickel oxide Composite (GO/NiO). International conference on Chemical Education, Chemical Education & Research for Industrial Development & Sustainable Growth in a Knowledge Based Economy.
- **C.H.Manoratne**, A.Ratnakumar, S.R.D.Rosa 2013. Understanding the effect of particle (powder) size of commercially available graphite powder on the synthesis and characterization of graphene oxide. Sri Lanka Association for the Advancement of Science, Proceedings of the 69<sup>th</sup> Annual Sessions-2013. Part 1.
- D.M.W.D. Divisekara, L.D.C.Nayanajith, **C.H.Manoratne**.M.D.Yoga Milani. A simple in *vitro* method for the detection of antimicrobial activity of titanium dioxide coated materials against *Escherichia coli* and *Staphylococcus aureus*". Sri Lanka


Association for the Advancement of Science, Proceedings of the 64<sup>th</sup> Annual Sessions-2013. Part 1.

- **C.H. Manoratne**, L.D.C. Nayanajith, I.R.M. Kottegoda 2012. Development of low cost and highly effective self-cleaning ceramic tiles using nanotechnology. First National Nanotechnology Conference.
- **C. H. Manoratne**, R. M. G. Rajapakse, M. A. K. L. Dissanayake, W. M. A. T. Bandara D. T. B. Tennakoon, and J. S. H. Q. Perera 2004. The effect of montmorillonite on conductivity enhancement in the system of (PEO)<sub>9</sub>LiCF<sub>3</sub>SO<sub>3</sub> polymer electrolyte. University Research Sessions PURSE-2004, Proceedings and Abstracts.
- M.A.K.L. Dissanayake, D.T.B. Tennakoon, J.S.H.Q. Perera, W.M.A.T. Bandara, R.M.G. Rajapakse, **C.H. Manoratne** 2003. Mechanism of intercalation of poly (ethylene oxide) in bentonite clay. Annual Research Sessions of University Peradeniya.
- J.S.H.Q.Perera, R.M.G.Rajapakse\*,D.T.B.Tennakoon, **C.H..Manoratne**, D.M.M. krishantha and M. V. K. Perera 2002. Multi-layer polyaniline Assemblies in Bentonite Clay. Ceylon Journal of Science.
- J.S.H.Q. Perera, R.M.G. Rajapakse, D.T.B. Tennakoon, **C.H.Manoratne** and D.M.M. Krishantha 2002. Effect of concentration of anilinium ions in synthesis of multi-layer polyaniline assemblies in bentonite clay. Annual Research Sessions of University of Peradeniya.
- J.S.H.Q. Perera, R.M.G. Rajapakse, D.T.B. Tennakoon, **C.H.Manoratne** and D.M.M. Krishantha 2001. Intercalation of conducting polymer within layered materials. Annual Research Sessions of University of Peradeniya

## Patents

1. A stable composite electrode based on graphite and clay for high-temperature and general electrochemical applications, K.S.P. Karunadasa, **C.H. Manoratne**- Patent Application No 20844 (**Pending**)
2. Environmentally-friendly, controlled-release fruit and melon flies attractive product based on Ocimum extracts and natural-nanocomposite substrate, R.M.Dharmadasa, **C.H. Manoratne**.The Registry of Patents and Trade Marks, Sri Lanka, 2017, Patent Applied number 18249. **Granted**
3. I.R.M. Kottegoda, L.D.C.Nayanajith, **C.H.Manoratne**, M.T.V.P.Jayaweera (Industrial Technology Institute) 2014. Preparation of graphene oxide and few layer graphene as a value addition to local graphite Sri Lanka, Patent Applied No. LK/P/1/18157. **Granted**
4. Development of highly stable dispersion of TiO<sub>2</sub>, M.G.M.U.Ismail, **C.H.Manoratne**, J.T.S.Mothes, L.D.C.Nayanajith, A.S.Liyanage, Patent No. The Registry of Patents and Trade Marks, Sri Lanka, 2009, Patent No. 15093. **Granted**
5. Development of Self-cleaning Ceramic Tile, **C.H. Manoratne**, J.T.S. Mothes, L.D.C. Nayanajith, I.R.M. Kottegoda, Yoga Milani, Patent No. *The Registry of Patents and Trade Marks, Sri Lanka*, 2011, Patent No. 15302. **Granted**
6. Environmentally-friendly, controlled-release fruit and melon flies attractive product based on Ocimum extracts and natural-nanocomposite substrate, R.M.Dharmadasa, **C.H. Manoratne**. The Registry of Patents and Trade Marks, Sri Lanka, 2017, Patent Applied number 18249 (pending).
7. I.R.M. Kottegoda, L.D.C.Nayanajith, **C.H. Manoratne**, M.T.V.P.Jayaweera (Industrial Technology Institute) 2014. Preparation of graphene oxide and few layer graphene as a value addition to local graphite Sri Lanka, Patent Applied No. LK/P/1/18157.

	<p>8. Development of highly stable dispersion of TiO<sub>2</sub>, M.G.M.U.Ismail, <b>C.H.Manorathne</b>, J.T.S.Mothes, L.D.C.Nayanajith, A.S.Liyanage, Patent No. The Registry of Patents and Trade Marks, Sri Lanka, 2009, Patent No. 15093.</p> <p>9. Development of Self-cleaning Ceramic Tile, <b>C.H. Manorathne</b>, J.T.S. Mothes, L.D.C. Nayanajith, I.R.M. Kottegoda, Yoga Milani, Patent No. <i>The Registry of Patents and Trade Marks, Sri Lanka</i>, 2011, Patent No. 15302.</p>
<p><b>Awards memberships, Scholarships &amp; Recognition</b></p>	<p><b>AWARDS/Recognition/Special Achievements</b></p> <ol style="list-style-type: none"> <li>1. Won the “Dasis Award” for the Most Outstanding Invention in Open Category of Sahasak Nimavum 2018, National Exhibition for Inventions &amp; Innovations at the Ceremony of National Inventors Day 2018 organized by the Sri Lanka Inventors Commission.</li> <li>2. Won “Gold Medal Winning Invention” of Sahasak Nimavum 2018, National Exhibition for Inventions &amp; Innovations at the Ceremony of National Inventors Day 2018 organized by the Sri Lanka Inventors Commission.</li> <li>3. Won an NRC Merit Award for Scientific Publication-2015 for the publication of “<b>JOURNAL OF MATERIALS SCIENCE AND TECHNOLOGY 2015, Vol 31, Iss 9, pp 907-912</b>”.</li> <li>4. Won an NRC Merit Award for Scientific Publication-2013 for the publication of “<b>JOURNAL OF EXPERIMENTAL NANOSCIENCE 2013, Vol 8, Iss 4, pp 462-479</b>”.</li> <li>5. Won an Achievement Award for “<b>Best Project with Nationally Significant Outputs 2015/2017</b>” for the project “Formulation of a Bactrocera Species Controlling Agent (BASCA) from local varieties of Ocimum sanctum for the control of fruit and melon flies” at the 3<sup>rd</sup> Biennial Research Symposium, 2017.</li> <li>6. Won an Appreciation Award for “In recognition of award winning academic and scientific excellence” at the 3<sup>rd</sup> Biennial Research Symposium, 2017 on “Energizing Economic Growth Through Science, Technology &amp; Innovation”.</li> <li>7. Won an Appreciation Award for “In recognition of award winning contributions to scientific research” at the ITI Annual Research Symposium, 2013 on “Advancing Scientific Industrial research through Innovative research &amp; Development”.</li> <li>8. Won the Award for one of the best five poster presentations at “International Conference on Chemical Sciences” Institute of Chemistry, Sri Lanka, 20<sup>th</sup> to 22<sup>nd</sup> June, 2012.</li> </ol> <p><b>Title:</b> “Synthesis and Characterization of Graphite Composites for Application in Lithium ion Batteries and in Solar Cells”, <b>Manorathne C.H</b>, Nayanajith L.D.C., Kottegoda I.R.M. 2012</p> <p><b>MEMBERSHIPS</b></p> <ol style="list-style-type: none"> <li>1. A member of the Sri Lanka Association for the Advancement of Science (SLAAS), Sri Lanka - Year of obtained 2010.</li> <li>2. A member of the Young Scientist Forum of National Science and Technology Commission (YSF/NASTEC), Sri Lanka- Year of obtained 2007.</li> </ol>
<p><b>Major Projects Undertaken as Principal Investigator (PI)</b></p>	<p><b>Funded Project</b></p> <ol style="list-style-type: none"> <li>1. “A stable composite based on titanium dioxide and clay as an effective photocatalyst for wastewater treatment”, funded by <b>National Research Council</b>-commenced in November 2020 and continuing (NRC-20-014).</li> </ol> <p><b>TG Funded Project</b></p>

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- I. “Fabrication of low cost graphite-based composite electrode for electrochemical applications (at high-temperature) as a value addition to local minerals”, a treasury grant (TG-19/181) funded by ITI- commenced in June 2019 and successfully completed.
  - II. 2. “Study the distribution, and quantification of micro-plastics & the accompanied pollutant assemblages in the aquatic environments in Sri Lanka”, a treasury grant (TG-18/185) funded by ITI- commenced in March 2019 and continuing (Collaborative project with CML). **Collaborator**