

Dr. Krupakar Parthasarathy

Scientist D

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Currently working as a Scientist D in Centre for Drug Discovery and Development, Sathyabama Institute. I have been in academic and research for more than 18 years with national and international working experience. Highly technical competent in research and development, bridging academic research and industry for product development, expertise in handling projects from diverse fields of basic and applied research in infectious diseases Dengue, CoVID-19 and TB), diagnostics and therapeutics.

Work Experience:

| S.No | Positions held | University/Institute | Teaching/ Research | Period | Duration |
|------|---|--|--------------------------------------|---------------------------|------------------|
| 1 | Scientist D | Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India | <i>Research Teaching</i> | Aug 2015 To present | 5.3 Years |
| 2 | Second Post-Doctoral Research Fellow | School of Biological Sciences, Nanyang Technological University, Singapore. | <i>Research</i> | May 2015 June 2015 | 2 Months |
| 3 | Consultant | School of Biological Sciences, Nanyang Technological University, Singapore. | <i>Research</i> | Jan 2015 April 2015 | 4 Months |
| 4 | Visiting Scientist | Centre for Drug Discovery and Development, Sathyabama Institute of Science and Technology, Chennai, India | <i>Research</i> | July 2014 to July 2015 | 1 Year |
| 6 | First Post-Doctoral Research Fellow | Department of Microbiology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore | <i>Research</i> | Jul 2010- sep 2014 | 4 Years 2 Months |
| 7 | Graduate Research Scholar | School of Biological Sciences, Nanyang Technological University, Singapore | <i>Research and Teaching</i> | Aug 2006- Jul 2010 | 4 Years |
| 8 | Research Associate | School of Biological Sciences, Nanyang Technological University, Singapore | <i>Research</i> | Apr 2004- Jul 2006 | 2 Years 2 Months |
| 9 | Resource person and teaching assistant | School of Biological Sciences, Madurai Kamaraj University, India | <i>Teaching and Research</i> | Apr-2003 to Apr-2004 | 1 Year |

Academic Qualification:

| <i>Name of the College /Institute and University</i> | <i>Year of degree awarded</i> | <i>Subject(s) of Specialization</i> | <i>Percentage of Marks</i> |
|--|-------------------------------|---|----------------------------|
| Sri Sankara Arts and Science College/ University Of Madras, Tamilnadu, India | 2001 | BSc. Microbiology | 70% (FIRST CLASS) |
| School of Biological Sciences/Madurai Kamaraj University, Tamilnadu, India | 2003 | MSc. Microbial Gene Technology | 76% (FIRST CLASS) |
| School of Biological Sciences/ Nanyang Technological University, Singapore | 2011 | PhD Molecular biology, biophysics, chemical biology and structural biology. | |

Current areas of Research

- Role of Dengue Non-Structural protein1 (NS1) in disease progression.
- Infectious diseases low cost and rapid diagnostics development for Dengue, CoVID-19 and TB
- Structure and function relationship of Severe Acute Respiratory Syndrome (SARS) virus envelope, Nucleocapsid and membrane protein.
- Inhibitors for Dengue and SARS envelope and capsid protein from marine Actinomycetes and natural sources.
- CRISPR CAS Genome editing for infectious diseases diagnostics and therapeutics development

Research experience related to SARS Coronavirus (2004- 2011) as Research Associate and Doctoral Student at School of Biological Sciences, NTU, Singapore

Thesis Title: Structural and functional characterization of severe acute respiratory syndrome (SARS) Coronavirus (CoV) envelope (E) protein

The coronaviruses are a large group of enveloped, positive stranded RNA viruses that infect mammals and birds, causing principally respiratory or enteric diseases. They infect their hosts in a species-specific manner which could be acute or persistent. The SARS CoV contains small envelope protein (E) which is involved in virus morphogenesis and possibly host apoptosis. SARS-CoV E is 76 residues long, with one N-terminal transmembrane (TM) domain, a cluster of three juxtamembrane cysteine residues and a less hydrophobic C-terminus tail. My thesis explores the structure and possible function of the SARS-CoV E protein.

Important Achievements in Doctoral Research

- The **SARS-CoV E protein was expressed using a novel fusion protein**, referred as β -barrel platform (BBP) (a modified outer membrane protein A (OmpA)). To our knowledge this is the first study to obtain purified CoV E proteins for structural and functional characterization.
- We found that the **E protein forms pentamers stabilized by TM domain** in lipid bilayers and

can act as ion channel by conducting sodium ions.

- The **channel can be blocked using the channel inhibitor drug HMA** and the molecular mechanism of the inhibitor has been elucidated for drug development.
- PhD work has generated **six high impact international publications** including PLOS pathogens and the research work has been **presented in local and international conferences**.
- Successfully completed a diverse range of projects from conception through implementation with **excellent project management skills**.
- **Trained and supervised seven students for the final year projects (FYP)** from School of Biological Sciences, NTU and **four attachment students from Nanyang Polytechnic**, Singapore.

Publications:

| S.No | Authors, year of publication | Title of Paper | Name of the Journal volume, page numbers, |
|------|--|---|---|
| 1 | Hotra , Ragunathan , Ng , Seankongsuk,Kalyanasundaram R, Anbarasu S, <u>Parthasarathy Krupakar</u> , Dröge P, Poulsen A, Tan JHL, Pethe K, Dick T, Bates RW, Grüber G Etal. | <i>Discovery of a novel Mycobacterial F-ATP synthase inhibitor and its potency in combination with diarylquinolines</i> | <u>Angew Chem Int Ed Engl.</u> 2020 Apr 26. IF 12.95 |
| 2 | D.Lavanya, R. Balagurunathan, Radhakrishnan Manikkam <u>Krupakar Parthasarathy (2020)</u> | <i>Inhibitory activity of Marine Actinobacterial Extracts against Dengue-2 Virus</i> | Accepted for Publication in Research Journal of Biotechnology. |
| 3 | Anbarasu Sivaraj VanajaKumar Revathy Sunder, <u>Krupakar Parthasarathy</u> , Govindaraju Kasivelu (2019) | <i>Commercial Yeast Extracts Mediated Green Synthesis of Silver Chloride Nanoparticles and their Anti-mycobacterial Activity</i> | Journal of Cluster Science · July 2019 |
| 4 | K. Govindaraju, K. Vijai Anand , S. Anbarasu, J. Theerthagiri, S. Revathy, <u>P. Krupakar</u> , G. Durai, M. Kannan, K.S. Subramanian (2019) | <i>Seaweed (Turbinaria ornata)- assisted green synthesis of magnesium hydroxide [Mg(OH)2] nanomaterials and their anti-mycobacterial activity</i> | Materials Chemistry and Physics 239 (2020) 122007 |
| 5 | Anbarasu Sivaraj, Revathy Sundar, Radhakrishnan Manikkam, <u>Krupakar Parthasarathy</u> , Uma Rani, Vanaja Kumar (2018) | <i>Potential Applications of Lactic Acid Bacteria and Bacteriocins in Antimycobacterial Therapy- Mini Review</i> | Asian Pacific Journal of Tropical Medicine 2018:11(8)543-459 |
| 6 | K.S. Uma Suganya, K. Govindaraju a, V. Ganesh Kumara, V. Karthick, <u>Krupakar Parthasarathy (2016)</u> | <i>Pectin mediated gold nanoparticles induces</i> | International Journal of Biological |

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| | | <i>apoptosis in mammary adenocarcinoma cell lines</i> | Macromolecules 93 1030–1040. |
| 7 | Eugenia Li Ling Yeo, Anthony Jin Shun Chua, Krupakar Parthasarathy , Mah Lee Ng and James Chen Yong Kah (2015) | <i>Understanding aggregation based assays: nature of protein corona and number of epitopes on antigen matters</i> | RSC Adv. , 2015, 5, 14982 |
| 8 | Xin Lin *; Krupakar Parthasarathy* ; Wahyu Surya; Tong Zhang; Yuguang Mu, Jaime Torres (2014)* <i>equal contribution</i> | <i>A conserved tetrameric interaction of Cry toxin helix α-3 suggests a functional role for toxin oligomerization</i> | Biochim Biophys Acta. 2014 Jul;1838(7):1777-84 |
| 9 | Chong Mun Keat*, Parthasarathy Krupakar* , Yeo Hui Yu; Ng, Mah Lee (2013) <i>*equal contribution</i> | <i>Optimized Sequential Purification Protocol for in vivo Site-Specific Biotinylated Full-Length Dengue Virus Capsid Protein</i> | Protein Engineering, Design and Selection , May; 26(5):377-87. |
| 10 | Krupakar Parthasarathy , Malathy Sony S.M | <i>Exploring Microbes for the production of viral antigens. ISSN: 22781250</i> | Journal of current perspectives in applied Microbiology Vol 3 (2) P.No 1-13. 2014. |
| 11 | Victor Banerjee, Rajiv K. Kar, Aritreyee Datta, Krupakar Parthasarathy , Subhrangsu Chatterjee, Kali P. Das, and Anirban Bhunia (2013) | <i>Use of a Small Peptide Fragment as an Inhibitor of Insulin Fibrillation Process: A Study by High and Low Resolution Spectroscopy.</i> | PLoS ONE 8(8): e72318. |
| 12 | Krupakar Parthasarathy , Huang Lu, Wahyu Surya, Ardcharaporn Vararattanavech, Konstantin Pervushin, Jaime Torres. (2012). | <i>Expression and purification of Coronavirus envelope proteins using a modified β-barrel construct</i> | Protein Expression and Purification Volume 85 (1) Pages 133–141 |
| 13 | Ardcharaporn Vararattanavech, Choon-Peng Chng, Parthasarathy Krupakar , Xiao-Yan Tang, Jaime Torres, Suet-Mien Tan. (2010). | <i>A transmembrane polar interaction is involved in the functional regulation of integrin αLβ2</i> | Journal of Molecular Biology 398 (4), pp. 569-583 |
| 14 | Pervushin Konstantin, Tan Edward, Parthasarathy Krupakar , Lin X, Jiang FL, et al (2009). | <i>Structure and Inhibition of the SARS Coronavirus Envelope Protein Ion Channel</i> | PLoS Pathogens 5(7): e1000511 |
| 15 | Parthasarathy Krupakar , L. Ng, X. Lin, D. Liu, K. Pervushin, X. Gong, J. Torres (2008) | <i>Structural Flexibility of the Pentameric SARS Coronavirus Envelope Protein Ion Channel.</i> | Biophysical Journal , Volume 95, Issue 6, Pages L39-L41. |
| 16 | Parthasarathy Krupakar , Lin, X., Tan, S. M., Alex Law, S.K., Torres, J. (2008). | <i>Transmembrane helices that form two opposite homodimeric interactions: An asparagine scan study of αM and β2 integrins</i> | Protein Science , Volume 17 Issue 5, Pages 930 –938. |

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| 17 | Torres, J., Maheswari, U., Parthasarathy Krupakar , Ng, L., Ding, X.L., Gong, X. (2007) | <i>Conductance and amantadine binding of a pore formed by a lysine-flanked transmembrane domain of SARS coronavirus envelope protein</i> | <i>Protein Science</i> 16 (9), pp. 2065-2071. |
| 18 | Torres, J*, Parthasarathy Krupakar* , Lin, X., Saravanan, R., Kukol, A., Ding, X.L. (2006) <i>*Equal Contribution</i> | <i>Model of a putative pore: The pentameric α-helical bundle of SARS coronavirus E protein in lipid bilayers</i> | <i>Biophysical Journal</i> 91(3), pp. 938-947. |
| 19 | Boonserm, P., Moonsom, S., Boonchoy, C., Promdonkoy, B., Parthasarathy Krupakar. , (2006) | <i>Association of the components of the binary toxin from Bacillus sphaericus in solution and with model lipid bilayers</i> | <i>Biochemical and Biophysical Research Communications</i> 342 (4), pp. 1273-1278 |
| 20 | Torres, J., Wang, J., Parthasarathy Krupakar , Liu, D.X. (2005) | <i>transmembrane oligomers of coronavirus protein E</i> | <i>Biophysical Journal</i> 88 (2), pp. 1283-1290. |
| 21 | Krupakar Parthasarathy , Ngo Mei Li Audrey and Ng Mah Lee Mary (2011) | <i>Optimized Purification Protocol for Proteins Isolated from Inclusion Bodies</i> | <i>Book chapter Protein Purification Pages 147-170</i> |

Research Projects (Ongoing: 2, Completed :2)

| S. No | Name of the project | PI / Co-PI | Name of the Agency | Sanctioned Amount | Amount received so far | Year | |
|-------|--|------------|--|-------------------|------------------------|------------|------------|
| | | | | | | From | To |
| 1 | <i>Controlling the Dengue virus infection using the extracts of marine Actinomycetes by identifying the mechanistic route involving the Envelope/Nucleo-capsid protein."</i> | PI | DST-SERB Young Scientist Scheme | 28.4 Lakhs | 26 Lakhs | March 2016 | March 2019 |
| 2 | <i>Targeting the Herpes Simplex Virus (HSV) entry and fusion by identifying the glycoprotein inhibitors from marine algae Sargassum.</i> | Co-PI | DST-SERB ECR | 33.6 Lakhs | 31 lakhs | Dec 2016 | Dec 2019 |
| 3 | Identification of Biomarkers for the development of Rapid diagnostics of Pulmonary Tuberculosis by quantum dot bio-imaging | PI | MHRD SPARC (Scheme for Promotion of Academic and Research Collaboration) | 48.8 Lakhs | 15 Lakhs | Mar 2019 | Mar 2021 |

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| | | | With NTU Singapore | | | | |
| 4 | <i>Polyherbal formulation for reducing the viral load of respiratory diseases (CoVID 19) using steam therapy</i> | PI | Sathyabama Institute Seed Funding for Product development | 2 Lakhs | 0.5 Lakhs | Sep 2020 | Dec 2021 |

List of Patents and Inventions by Dr. Krupakar Parthasarathy (2 International, 1 National)

| S.NO | Inventors | Title of the Invention | National /International | Details of the patent |
|------|--|--|-------------------------|--|
| 1 | Ng Mah Lee Mary; Parthasarathy Krupakar , Hayden and Chong Mun Keat | Optimized sequential purification for in-vivo site-specific biotinylated full-length Flavivirus structural and non-structural proteins | International | <i>USPTO Biotinylated protein WO 2014081398 A1</i> |
| 2 | Krupakar Parthasarathy , Yeo Hui Yu Hayden, Ng Mah Lee Mary | Modified aptamers bind to envelope DIII protein and neutralize West Nile virus | International | <i>USPTO Aptamers for binding flavivirus proteins WO 2015072923 A1</i> |
| 3 | Krupakar Parthasarathy , Sambandam Shanmugasundaram,. | Preparation of Bio-active Oligosaccharides exhibiting antimitotic activity from polysaccharides of Moringa oleifera Lam | National | <i>Indian Patent (No: 218499)</i> |

Recently Organized International conference and Workshops

1. Joint Online International Workshop for Faculty Development on CRISPR/Cas9 Human Genome Engineering: Basics and Applications Organised by Centre for Drug Discovery and Development, Centre for Professional and Career Advancement, Sathyabama Institute of Science and Technology, India In association with **Genome Engineering Laboratory, School of Life Sciences, University of Westminster**, London, UK. Date : 24th – 29th August 2020 Time : 4 PM – 6 PM Everyday (IST), Sathyabama Co-Ordinator : **Dr. Krupakar Parthasarathy**

2. MHRD-SPARC (Ministry of Human Resource Development- Scheme for Promotion of Academic & Research Collaborations) International Online Faculty & Student Development Programme on “Translational and Interdisciplinary research in human Diseases Management” CDDD- Sathyabama in Association with **Nanyang Technological University, Singapore**. Date: 24th to 30th July 2020 , Time: 10 AM -12 PM (Indian Time). **Convener: Dr. Krupakar Parthasarathy**.

Dr. Krupakar Parthasarathy As Invited Person as Resource person for the Conferences and in Faculty Development program related to CoVID 19. Representing CDDD and Sathyabama Institute of Science and Technology. Total : 10

1. Emerging and re-emerging of Infectious viral diseases: Need of the hour” Centre for Molecular and Nanomedicine sciences, Centre for Nanoscience and Nanotechnology, Sathyabama Institute of Science and Technology. ***Coronavirus: SARS, MERS and COVID-19 Envelope protein a potential drug target.***
2. Novel Microbes and Newer Threats organized by CDDD, Sathyabama, Title “***Coronavirus: What is so special about COVID-19 in relation to pandemic.***
3. CoVID-19-Disease Control Management Organized by CLATR, Sathyabama “Impact of Recombinant Engineering and its biological significance of Viral proteins”.
4. ***CoVID-19: A Global Scenario***, DBT STAR College Sponsored Zoom Webinar Series Hindusthan College of Arts and Science, Coimbatore.
5. Webinar Series on Global Perspectives in Biotechnology CoVID-19: ***Role of Biotechnology in combating diseases now and in future*** P.S.R Engineering College, Sivakasi.
6. Microbiology and Biotechnology staff of the Periyar University, Salem and its affiliated college on the theme “CURRENT TRENDS IN MICROBIAL RECRUDESCENCE” with the title ***Combating COVID – 19 based on lessons learnt from SARS & MERS.*** Periyar University, Salem
7. ***"CoVID: Transmission, Virus, Host and Prevention"*** which is organized for students and research scholars of the Auxilium College, Vellore.
8. Programme on Multiomics and traditional approaches to combat Covid 19 virus outbreak ”Organised by the School of Life Sciences, Crescent Institute of Science and Technology, Chennai In association with Tamilnadu State Council for Science and Technology under the title ***"Proteomics based approaches for Combating CoVID-19 lessons learnt from SARS and MERS"***, Crescent Institute of Science and Technology, Chennai.
9. Diagnostics and Therapeutics of CoVID 19 Pandemic Current issues and Challenges, Krishna College Vizag, Telungana
10. CRISPR/ Cas technology, Genome Engineering in infectious disease biology research and rapid diagnostics development, Sathyabama- University of Westminster, UK, London Genome Engineering joint Indo-UK Workshop.