

## **Prof. R. Jayakumar Profile**

**Professor, Centre for Nanosciences and Molecular Medicine, Amrita University, Kochi-682041, Kerala, India**

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**Dr. R. Jayakumar-Professor** at Amrita Center for Nanosciences and Molecular Medicine (ACNSMM), Amrita Institute of Medical Sciences and Research Centre, Kochi-682041, India-specializing in the area of Biopolymeric Nanomaterials. Dr. R. Jayakumar joined ACNS during November-2007. He received his Ph.D. in Polymer Chemistry from the Anna University, Chennai, India (2002). He has **over 225 Journal publications, 8 book chapter and 9 patents** to his credit. His publications have been cited more than **12200 times with *h-index-57***. In addition, he has also edited and published **5 books**. Dr. Jayakumar's research laboratory at Amrita Center for Nanosciences and Molecular Medicine is mainly interested in the development of polymeric nanofibers, nanogels, nanoparticles, nanocomposite scaffolds and injectable hydrogels for tissue engineering, Targeted Cancer drug delivery/imaging and wound healing applications. As a postgraduate, he ranked third in the M. Sc from Bharathidasan University. He was awarded the University Postdoctoral Fellowship from Chonbuk National University (2002-2003), South Korea and FCT Postdoctoral Fellowship from the Government of Portugal (2003-2005). In addition, he was also awarded the prestigious JSPS Postdoctoral Fellowship (2005-2007) from the Japan Society for the Promotion of Science (JSPS), Japan. He also received "Young Investigator Fellowship-2008" from Department of Science and Technology (DST), India. He received "Faculty Researcher Award-2016" from Indian Chitin and Chitosan Society and "MRSI Medal-2017" from Materials Research Society of India. He is also reviewer and editorial board member of many international journals. He also completed more than 15 funded projects and 3 are ongoing.

### **Education (Post-Graduation onwards & Professional Career)**

SI No.	Institution Place	Degree Awarded	Year	Field of Study
1	University of Madras, Tamilnadu	<b>B. Sc</b>	1993	Chemistry
2	Bharathidasan University, Tamilnadu	<b>M. Sc</b>	1995	Chemistry
3	Anna University, Chennai, Tamilnadu	<b>Ph. D</b>	2002	Polymer Chemistry-Synthesis & Characterization

### **A. Position and Honors**

#### **Position and Employment (Starting with the most recent employment)**

SI No.	Institution Place	Position	From (Date)	To (date)
1	Amrita Institute of Medical Sciences, Amrita University, Kochi, Kerala	<b>Associate Professor</b>	01-01-2011	Till date
2	Amrita Institute of Medical Sciences, Amrita University, Kochi, Kerala	<b>Associate Professor</b>	19-11-2007	31-12-2010
3	Kansai University, Japan	<b>JSPS Postdoctoral Researcher</b>	1-11-2005	31-10-2007
4	University of Minho, Portugal	<b>FCT Postdoctoral Researcher</b>	24-11-2003	31-5-2005
5	Chonbuk National University, South Korea	<b>Postdoctoral Researcher</b>	09-9-2002	31-8-2003
6	Anna University, Chennai, Tamilnadu	<b>Senior Research Fellow</b>	1-11-2000	31-8-2002
7	Micro Labs Ltd., Hosur, Tamilnadu	<b>Q. C. Chemist</b>	16-8-1995	14-8-1998

### ❖ International Collaborations:

- ❖ **Prof. Hiroshi Tamura & Tetsuya Furuike**, Materials and Bioengineering, Kansai University, **Japan**.
- ❖ **Dr. Bruno Sarmento**, Department of Pharmaceutical Technology, University of Porto, **Portugal**.
- ❖ **Prof. Joel D. Bumgardner**, Department of Biomedical Engineering, University of Memphis, **USA**.
- ❖ **Prof. Sachiko Iseki**, Molecular Craniofacial Embryology, Tokyo Medical and Dental University, **Japan**.
- ❖ **Prof. In-Kyu Park**, Department of Biomedical Engineering, Chonnam Medical School, **South Korea**.
- ❖ **Prof. Nathaniel Hwang**, School of Chemical and Biological Engineering, Seoul National University, **South Korea**.
- ❖ **Prof. Jyh-Ping Chen**, Department of Chemical and Materials Engineering, Chang Gung University, **Taiwan**.
- ❖ **Prof. Aldo R. Boccaccini**, Department of Materials Science and Engineering, University of Erlangen-Nuremberg, **Germany**.

### Research Activities:

**Ph. D: Guided; 10 Guiding: 6; M. Tech: Guided: 36; Guiding: 3**

**Total Citations-12200; h-index-57**

### List of Publications

**Research & Review Articles: 225; Patents: 09; Edited Books: 4; Book Chapter: 8**

### Selected Publications:

1. S. Sowmya, Ullas Mony, P. Jayachandran, S. Reshma, R. Arun Kumar, H. Arzate, S. V. Nair & **R. Jayakumar**, "Tri-layered Nanocomposite Hydrogel Scaffold for the Concurrent Regeneration of Cementum, Periodontal Ligament and Alveolar Bone", **Advanced Healthcare Materials**, 6, 2017, 1601251.
2. T. R. Nimal, G. Baranwal, M. C. Bavya, Raja Biswas & **R. Jayakumar**, "Anti-staphylococcal Activity of Injectable Nano Tigecycline/Chitosan-PRP Composite Hydrogel Using Drosophila melanogaster Model for Infectious Wounds", **ACS Applied Materials & Interfaces**, 8, 2016, 22074-22083.
3. S. Deepthi, Amna A. Abdul Gafoor, A. Sivashanmugam, S. V. Nair & **R. Jayakumar**, "Nanostrontium Ranelate Incorporated Injectable Hydrogel Enhanced Matrix Production Supporting Chondrogenesis *in vitro*", **Journal of Materials Chemistry-B**, 4, 2016, 4092-4103.
4. M. Annapoorna, T. R. Nimal, Vishnu Das, Sahadev A. Shankarappa, Raja Biswas & **R. Jayakumar**, "Drug Loaded Bi-layered Sponge for Wound Management in Hyperfibrinolytic Conditions", **Journal of Materials Chemistry-B**, 3, 2015, 5795-5805.
5. S. Sowmya, K. P. Chennazhi, H. Arzate, P. Jayachandran, S. V. Nair & **R. Jayakumar**, "Periodontal Specific Differentiation of Dental Follicle Stem Cells into Osteoblast, Fibroblast and Cementoblast", **Tissue Engineering-C: Methods**, 21, 2015, 1044-1058.
6. M. Annapoorna, P. T. Sudheesh Kumar, Raja Biswas, V-K. Lakshmanan & **R. Jayakumar**, "Exploration of Alginate Hydrogel/Nano Zinc Oxide Composite Bandages for Infected Wounds", **International Journal of Nanomedicine**, 10, 2015, 53-66.
7. N. Sanoj Rejinold, **R. Jayakumar** & Yeu-Chun Kim, "Radio Frequency Responsive Nano-Biomaterials for Cancer Therapy", **Journal of Controlled Release**, 204, 2015, 85-97.

8. R. Arun Kumar, A. Sivashanmugam, S. Deepthi, Sachiko Iseki, K. P. Chennazhi, S. V. Nair & **R. Jayakumar**, "Injectable Chitin-Poly( $\epsilon$ -Caprolactone)/Nano Hydroxyapatite Composite Microgels Prepared by Simple Regeneration Technique for Bone Tissue Engineering", **ACS Applied Materials & Interfaces**, 7, 2015, 9399-9409.
9. S. Deepthi, K. Jeevitha, M. Nivedhitha Sundaram, K. P. Chennazhi & **R. Jayakumar**, "Chitosan-Hyaluronic Acid Hydrogel Coated Poly(caprolactone) Multiscale Bilayer Scaffold for Ligament Regeneration", **Chemical Engineering Journal**, 260, 2015, 478-485.
10. M. Annapoorna, B. S. Anisha, K. P. Chennazhi & **R. Jayakumar**, "Chitosan-Hyaluronic Acid/VEGF Loaded Fibrin Nanoparticles Composite Sponges for Enhancing Angiogenesis in Wounds", **Colloids and Surfaces-B: Biointerfaces**, 127, 2015, 105-113.
11. Amal J. Sivaram, P. Rajitha, S. Maya, **R. Jayakumar** & M. Sabitha, "Nanogels for Delivery, Imaging and Therapy", **WIREs Nanomedicine and Nanobiotechnology**, 7, 2015, 509-533.
12. V. Kiruthika, S. Maya, Maneesha K Suresh, V. Anil Kumar, **R. Jayakumar** & Raja Biswas, "Comparative Efficacy of Chloramphenicol Loaded Chondroitin Sulfate and Dextran Sulfate Nanoparticles to Treat Intracellular *Salmonella* Infections", **Colloids and Surfaces-B: Biointerfaces**, 127, 2015, 33-40.
13. A. Anitha, S. Sowmya, P. T. Sudheesh Kumar, S. Deepthi, K. P. Chennazhi, H. Ehrlich, M. Tsurkan & **R. Jayakumar**, "Chitin and Chitosan in Selected Biomedical Applications", **Progress in Polymer Science**, 39, 2014, 1644-1667.
14. S. Maya, Bruno Sarmiento, V-K. Lakshmanan, D. Menon & **R. Jayakumar**, "Actively Targeted Cetuximab Conjugated  $\gamma$ -Poly (glutamic acid)-Docetaxel Nanomedicines for EGFR Over Expressing Colon Cancer Cells", **Journal of Biomedical Nanotechnology**, 10, 2014, 1416-1428.
15. S. Deepthi Sankar, K. T. Shalumon, K. P. Chennazhi, D. Menon & **R. Jayakumar**, "Surface Plasma Treatment of Poly(caprolactone) Micro, Nano and Multiscale Fibrous Scaffolds for Enhanced Osteoconductivity", **Tissue Engineering-A**, 20, 2014, 1689-1702.
16. N. Sindhura Reddy, S. Sowmya, J. D. Bumgardner, K. P. Chennazhi, Raja Biswas & **R. Jayakumar**, "Tetracycline Nanoparticles Loaded Calcium Sulfate Composite Beads for Periodontal Management", **Biochimica et Biophysica Acta-General Subjects**, 1840, 2014, 2080-2090.
17. A. Anitha, N. Deepa, K. P. Chennazhi, V-K. Lakshmanan & **R. Jayakumar**, "Combinatorial Anticancer Effects of Curcumin and 5-Fluorouracil Loaded Thiolated Chitosan Nanoparticles Towards Colon Cancer Treatment", **Biochimica et Biophysica Acta-General Subjects**, 1840, 2014, 2730-2743.
18. S. Sowmya, K. P. Chennazhi, J. D. Bumgardner, S. V. Nair & **R. Jayakumar**, "Role of Nanostructured Biopolymers and Bioceramics in Dentin, Enamel and Periodontal Tissue Regeneration", **Progress in Polymer Science**, 38, 2013, 1748-1772.
19. S. Maya, Ullas Mony & **R. Jayakumar**, "Thermo-responsive Fibrinogen Nanogels: A Viable Thermo-responsive Drug Delivery Agent for Breast Cancer Therapy?", **Nanomedicine**, 19, 2014, 2721-2723.

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20. T. R. Arunraj, N. Sanoj Rejinold, M. Sabitha, Soumya Saroj, Raja Biswas & **R. Jayakumar**, "Synthesis, Characterization and Biological Activities of Curcumin Nanospheres", **Journal of Biomedical Nanotechnology**, 10, 2014, 238-250.
21. K. S. Snima, P. Arunkumar, **R. Jayakumar** & V-K. Lakshmanan, "Silymarin Encapsulated PLGA Nanoparticles: A Prospective Candidate for Prostate Cancer Therapy", **Journal of Biomedical Nanotechnology**, 10, 2014, 559-570.
22. N. Sanoj Rejinold, Reju George Thomas, M. Muthunayanan, K. P. Chennazhi, In-Kyu Park, Yong Yeon Jeong, K. Manzoor & **R. Jayakumar**, "Radio Frequency Triggered Curcumin Delivery from Thermo- and pH Responsive Nanoparticles Containing Gold Nanoparticles and its in Vivo Localization Studies in Orthotopic Breast Tumor Model", **RSC Advances**, 4, 2014, 39408-39427.
23. N. Ashwin Kumar, S. Maya & **R. Jayakumar**, "Redox-responsive Cystamine Conjugated Chitin-Hyaluronic Acid Composite Nanogels", **RSC Advances**, 4, 2014, 49547-49555.
24. P. T. Sudheesh Kumar, G. Praveen, Mincy Raj, K. P. Chennazhi & **R. Jayakumar**, "Flexible, Micro-Porous Chitosan-Gelatin Hydrogel/Nano Fibrin Composite Bandages for Treating Burn Wounds", **RSC Advances**, 4, 2014, 65081-65087.
25. N. Deepa, A. Anitha, **R. Jayakumar** & K. P. Chennazhi, "*In Vitro* and *In Vivo* Evaluation of Osteoporosis Therapeutic Peptide PTH 1-34 Loaded PEGylated Chitosan Nanoparticles", **Molecular Pharmaceutics**, 10, 2013, 4159-4167.
26. N. Sanoj Rejinold, Thejus Baby, S. V. Nair & **R. Jayakumar**, "Paclitaxel Loaded Fibrinogen Coated CdTe/ZnTe Core Shell Nanoparticles for Targeted Imaging and Drug Delivery to Breast Cancer Cells", **Journal of Biomedical Nanotechnology**, 9, 2013, 1657-1671.
27. Sowmya Srinivasan, P. T. Sudheesh Kumar, Sreeja V. Nair, S. V. Nair, K. P. Chennazhi & **R. Jayakumar**, "Antibacterial and Bioactive  $\alpha$ ,  $\beta$ -Chitin Hydrogel/Nanobioactive Glass Ceramic/Nano Silver Composite Scaffolds for Periodontal Regeneration", **Journal of Biomedical Nanotechnology**, 9, 2013, 1803-1816.
28. B. S. Anisha, Deepthi Sankar, M. Annapoorna, K. P. Chennazhi, S. V. Nair & **R. Jayakumar**, "Chitosan-Hyaluronan/Nano Chondroitin Sulfate Ternary Composite Sponges for Medical Use", **Carbohydrate Polymers**, 92, 2013, 1561-1565.
29. K. T. Shalumon, K. P. Chennazhi, S. V. Nair & **R. Jayakumar**, "Development of Small Diameter Fibrous Vascular Grafts with Outer Wall Multiscale Architecture to Improve Cell Penetration", **Journal of Biomedical Nanotechnology**, 9, 2013, 1299-1305.
30. P. T. Sudheesh Kumar, Mincy Raj, Praveen Govinth, S. V. Nair, K. P. Chennazhi & **R. Jayakumar**, "*In vitro* and *In vivo* Evaluation of Micro-Porous Chitosan Hydrogel/Nano Fibrin Composite Bandage for Skin Tissue Regeneration", **Tissue Engineering-A**, 19, 2013, 380-392.
31. P. T. Sudheesh Kumar, C. Ramya, R. Jayakumar, S. V. Nair & V-K. Lakshmanan, "Drug Delivery and Tissue Engineering Applications of Biocompatible Pectin-Chitin/Nano CaCO<sub>3</sub> Composite Scaffolds", **Colloids and Surfaces-B: Biointerfaces**, 106, 2013, 109-116.
32. K. T. Shalumon, K. P. Chennazhi, S. V. Nair & **R. Jayakumar**, "High Thick Layer-by- Layer 3D Multiscale Fibrous Scaffolds for Enhanced Cell Infiltration and its Potential in Tissue Engineering", **Journal of Biomedical Nanotechnology**, 9, 2013, 2117-2122.

33. N. Mohammed, N. Sanoj Rejinold, M. Sabitha, Raja Biswas, S. V. Nair & **R. Jayakumar**, "Fluconazole Loaded Chitin Nanogels as a Topical Ocular Drug Delivery Agent for Corneal Fungal Infections", **Journal of Biomedical Nanotechnology**, 9, 2013, 1521-1531.
34. V. G. Deepagan & **R. Jayakumar** et al., "*In vitro* Targeted Imaging and Delivery of Camptothecin Using Cetuximab Conjugated Multifunctional PLGA-ZnS Nanoparticles", **Nanomedicine**, 7, 2012, 507-519.
35. P. T. Sudheesh Kumar, V. K. Lakshmanan, T.V. Anilkumar, P. Reshmi, A.G. Unnikrishnan, S. V. Nair & **R. Jayakumar**, "Flexible and Micro-porous Chitosan Hydrogel/Nano ZnO Composite Bandages for Wound Dressing: *In vitro* & *in vivo* Evaluation", **ACS Applied Materials & Interfaces**, 4, 2012, 2618-2629.
36. M. Sabitha, N. Sanoj Rejinold, A. Nair, V. K. Lakshmanan, S. V. Nair & **R. Jayakumar**, "Curcumin Loaded Chitin Nanogels for Skin Cancer Treatment via the Transdermal Route", **Nanoscale**, 4, 2012, 239-250.
37. K. T. Shalumon, D. Sathish, K. P. Chennazhi, H. Tamura, S. V. Nair & **R. Jayakumar**, "Fabrication of Electrospun Aligned Poly(Lactic acid)-Chitosan Nanofibers by Novel Parallel Blade Method for Skin Tissue Engineering", **Journal of Biomedical Nanotechnology**, 8, 2012, 405-416.
38. Nitya Ganesh, **R. Jayakumar**, K. Manzoor, U. Mony & S. V. Nair, "Embedded Silica Nanoparticles in Poly(Caprolactone) Nanofibrous Scaffolds Enhanced Osteogenic Potential for Bone Tissue Engineering", **Tissue Engineering-A**, 18, 2012, 1867-1881.
39. K. T. Shalumon, P.R. Sreerekha, D. Sathish, H. Tamura, S.V. Nair, K. P. Chennazhi & **R. Jayakumar**, "Hierarchically Designed Electrospun Tubular Scaffolds for Cardiovascular Applications", **Journal of Biomedical Nanotechnology**, 7, 2011, 609-620.
40. N. Sanoj Rejinold, K. P. Chennazhi, H. Tamura, S. V. Nair & **R. Jayakumar**, "Multifunctional Chitin Nanogels for Simultaneous Drug Delivery, Bioimaging and Biosensing", **ACS Applied Materials & Interfaces**, 3, 2011, 3654-3665.
41. P. T. Sudheesh Kumar, S. Sowmya, K. L. Vinoth, S. V. Nair, & **R. Jayakumar**, " $\beta$ -Chitin Hydrogel/Nano Hydroxyapatite Composite Scaffolds for Tissue Engineering Applications", **Carbohydrate Polymers**, 85, 2011, 584-591.
42. **R. Jayakumar**, M. Prabakaran, P. T. Sudheesh Kumar, S. V. Nair & H. Tamura, "Biomaterials Based on Chitin and Chitosan in Wound Dressing Applications", **Biotechnology Advances**, 29, 2011, 322-337.
43. N. Sanoj Rejinold, M. Muthunarayanan, K.P. Chennazhi, S. V. Nair & **R. Jayakumar**, "Curcumin Loaded Fibrinogen Nanoparticles for Cancer Drug Delivery", **Journal of Biomedical Nanotechnology**, 7, 2011, 521-534.
44. **R. Jayakumar**, S. V. Nair, N. Selvamurugan, M. Prabakaran, S. Tokura & H. Tamura, "Novel Carboxymethyl Derivatives of Chitin and Chitosan Materials and Their Biomedical Applications", **Progress in Materials Science**, 55, 2010, 675-709.
45. Mathew Peter, N. S. Binulal, S. V. Nair, N. Selvamurugan, H. Tamura & **R. Jayakumar**, "Novel Chitosan-Gelatin/Nano Bioactive Glass Ceramic Composite Scaffolds for Alveolar Bone Tissue Engineering Applications", **Chemical Engineering Journal**, 158, 2010, 353-361.

46. N. S. Binulal, M. Deepthy, N. Selvamurugan, K. T. Shalumon, S. Suja, U. Mony, **R. Jayakumar** & S. V. Nair, "Role of Nano-and Micro-Fibrous Poly(caprolactone) Scaffolds on Human Mesenchymal Stem Cell Attachment and Spreading for *in vitro* Bone Tissue Engineering-Response to Osteogenic Regulators", **Tissue Engineering-A**, 16, 2010, 393-404.
47. P. T. Sudheesh Kumar, S. Abhilash, K. Manzoor, S. V. Nair, H. Tamura & **R. Jayakumar**, "Preparation and Characterization of Novel  $\beta$ -Chitin/Nano Silver Composite Scaffolds for Wound Dressing Applications", **Carbohydrate Polymers**, 80, 2010, 761-767.
48. Ashish Dev, N. S. Binulal, A. Anitha, S. V. Nair, T. Furuike, H. Tamura & **R. Jayakumar**, "Preparation of Novel Poly(Lactic Acid)/Chitosan Nanoparticles for Anti-HIV Drug Delivery Applications", **Carbohydrate Polymers**, 80, 2010, 833-838.
49. Ashish Dev, J. C. Mohan, V. Sreeja, G. R. Patzke, S. V. Nair & R. Jayakumar, "Novel Carboxymethyl Chitin Nanoparticles for Cancer Drug Delivery Applications", **Carbohydrate Polymers**, 79, 2010, 273-279.
50. K. T. Shalumon, K. H. Anulekha, C. M Girish, R. Prasanth, S. V. Nair & **R. Jayakumar**, "Single Step Electrospinning of Chitosan/Poly(Caprolactone) Nanofibers Using Formic Acid/Acetone Solvent Mixture", **Carbohydrate Polymers**, 80, 2010, 414-420.
51. E. M. Manjusha, J. C. Mohan, K. Manzoor, S. V. Nair, H. Tamura & **R. Jayakumar**, "Folate Conjugated Carboxymethyl Chitosan-Manganese Doped Zinc Sulphide Nanoparticles for Targeted Drug Delivery and Imaging of Cancer Cells", **Carbohydrate Polymers**, 80, 2010, 443-449.
52. **R. Jayakumar**, M. Prabakaran, S. V. Nair & H. Tamura, "Novel Chitin and Chitosan Nanofibers in Biomedical Applications", **Biotechnology Advances**, 28, 2010, 142-150.
53. K. T. Shalumon, N. S. Binulal, N. Selvamurugan, S. V. Nair, D. Menon, T. Furuike, H. Tamura & **R. Jayakumar**, "Electrospinning of Carboxymethyl Chitin/Poly(Vinyl Alcohol) Nanofibrous Scaffolds for Tissue Engineering Applications", **Carbohydrate Polymers**, 77, 2009, 863-869.
54. A. Anitha, V. V. Divya Rani, R. Krishna, V. Sreeja, N. Selvamurugan, S. V. Nair, H. Tamura & **R. Jayakumar**, "Synthesis, Characterization, Cytotoxicity and Antibacterial Studies of Chitosan, O-Carboxymethyl and N, O-Carboxymethyl Chitosan Nanoparticles", **Carbohydrate Polymers**, 78, 2009, 672-677.
55. Mathew Peter, P. T. Sudheesh Kumar, N. S. Binulal, S. V. Nair, H. Tamura & **R. Jayakumar**, "Development of Novel Chitin/Nano Bioactive Glass Ceramic Nanocomposite Scaffolds for Tissue Engineering Applications", **Carbohydrate Polymers**, 78, 2009, 926-931.
56. H. Nagahama, H. Maeda, T. Kashiki, **R. Jayakumar**, T. Furuike & H. Tamura, "Preparation and Characterization of Novel Chitosan/Gelatin Membranes Using Chitosan Hydrogel", **Carbohydrate Polymers**, 76, 2009, 255-260.
57. H. Nagahama, N. Nwe, **R. Jayakumar**, S. Koiwa, T. Furuike & H. Tamura, "Novel Biodegradable Chitin Membranes for Tissue Engineering Applications", **Carbohydrate Polymers**, 73, 2008, 295-302.
58. **R. Jayakumar**, M. Prabakaran, R. L. Reis & J. F. Mano, "Graft Copolymerized Chitosan-Present Status and Applications", **Carbohydrate Polymers**, 62, 2005, 142-158.

59. **R. Jayakumar**, S. Nanjundan & M. Prabakaran, "Developments in Metal-Containing Polyurethanes, Co-polyurethanes and Polyurethane Ionomers", **Polymer Reviews**, 45, 2005, 231-261.
60. **R. Jayakumar** & S. Nanjundan, "Calcium-Containing Poly(urethane-urea)s; Synthesis, Spectral and Thermal studies", **Journal of Polymer Science, Part-A: Polymer Chemistry**, 42, 2004, 1809-1819.