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Volume 39

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Nanoscience in Medicine

Vol. 1

 Springer

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ISSN 2213-7114

ISSN 2213-7122 (electronic)

Environmental Chemistry for a Sustainable World

ISBN 978-3-030-29206-5

ISBN 978-3-030-29207-2 (eBook)

<https://doi.org/10.1007/978-3-030-29207-2>

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The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The arena of nanomedicine has developed rapidly due to numerous tailor-made nanomaterials and their ease of surface modification. In recent past, nanomaterials are reported to have noteworthy potential to manage diseases, and it is expected that they will change the face of medicine. Further, it has been realized that many of the vital concepts of nanomedicine have been overlooked, and they must be attended to utilize full potential of nanotechnology. Therefore, this book takes a systematic approach to address the gaps relating to nanomedicine and bring together fragmented knowledge on the advances on nanomaterials and their biomedical applicability. In particular, this book demonstrates an exclusive compilation of state of the art with a focus on fundamental concepts, current trends, limitations, and future directions of nanomedicine.

This book is also a platform to convey essential concepts of nanomedicine and how these concepts can be employed to develop advanced nanomaterials for a range of biomedical applications. Due to unique contribution of chapters from global leaders, this book has become an important reference source for scientists, teachers, doctors, research scholars, and university students, who are interested in the field. It also contains a textbook-like presentation of the important principles and applications of nanotechnology.

The first chapter by Meena has excellently introduced the nanovehicles for drug delivery system. The emerging nanocarriers for targeted drug delivery in cancer have been discussed in Chap. 2 by Singhvi and coauthors. In Chap. 3, Verma et al. have reviewed the therapeutic enzyme delivery mediated by gold nanoparticle. Improvement of vitamin A bioavailability by nanoencapsulation has been discussed by Maurya et al. in Chap. 4, and Rajak et al. have comprehensively discussed the nano-antimicrobials in Chap. 5. Chapter 6 is a critical discussion by Pramod on advanced oral delivery system for insulin using nanocarriers. The application of electrospun nanofibers for tissue engineering and regenerative medicine has been discussed by Johi et al. in Chap. 7. A multidimensional perspective on drug delivery system using solid lipid nanoparticles has been discussed by Pandey in Chap. 8. In Chap. 9 by Bansal et al., the overall perspective of nanomedicine in diagnosis and treatment has been discussed, while Chap. 10 by Nochehdehi et al. discusses the

iron- and cobalt-based bio-magnetic alloy nanoparticles for their biomedical applications. The application of nanoparticles in targeted and enhanced delivery of nucleic acid has been discussed in Chap. 11 by Penumarthy et al. Emam and coauthors have reviewed plasmonic hybrid nanocomposites for biomedical application in Chap. 12.

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Tumakuru, Karnataka, India
Johannesburg, South Africa
Lucknow, Uttar Pradesh, India
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Contents

1	Nanomaterials: A Promising Tool for Drug Delivery	1
	Priyanka Kumari, Suaib Luqman, and Abha Meena	
2	Nanocarriers as Potential Targeted Drug Delivery for Cancer Therapy	51
	Gautam Singhvi, Vamshi Krishna Rapalli, Shakti Nagpal, Sunil Kumar Dubey, and Ranendra Narayan Saha	
3	Gold Nanoparticle-Mediated Delivery of Therapeutic Enzymes for Biomedical Applications	89
	Madan L. Verma, Pankaj Kumar, Sneh Sharma, Karuna Dhiman, Deepka Sharma, and Aruna Verma	
4	Improving Bioavailability of Vitamin A in Food by Encapsulation: An Update	117
	Vaibhav Kumar Maurya, Manjeet Aggarwal, Vijay Ranjan, and K. M. Gothandam	
5	Antimicrobial Activity of Nanomaterials	147
	Bablu Lal Rajak, Rahul Kumar, Manashjit Gogoi, and Sanjukta Patra	
6	Advanced Nanostructures for Oral Insulin Delivery	187
	Chinnu Sabu and K. Pramod	
7	Electrospun Nano-architectures for Tissue Engineering and Regenerative Medicine	213
	Vandana Joshi, Chandra Mohan Srivastava, Anek Pal Gupta, and Monika Vats	
8	Solid Lipid Nanoparticles: A Multidimensional Drug Delivery System	249
	Abhishek Pandey	

9	Nanomedicine: Diagnosis, Treatment, and Potential Prospects	297
	Mahak Bansal, Alok Kumar, Madhu Malinee, and Tarun Kumar Sharma	
10	Biomedical Applications of Iron- and Cobalt-Based Biomagnetic Alloy Nanoparticles	333
	Amirsadegh Rezazadeh Nochehdehi, Sabu Thomas, Neerish Revaprasadu, Yves Grohens, and Nandakumar Kalarikkal	
11	Hitching a Ride: Enhancing Nucleic Acid Delivery into Target Cells Through Nanoparticles	373
	Alekhyia Penumarthy, Preetam Basak, Peter Smooker, and Ravi Shukla	
12	Plasmonic Hybrid Nanocomposites for Plasmon-Enhanced Fluorescence and Their Biomedical Applications	459
	Ahmed Nabile Emam, Ahmed Sadek Mansour, Mona Bakr Mohamed, and Gehad Genidy Mohamed	
	Index	489

About the Editors



Hemant Kumar Daima is an Assistant Professor at Amity University Rajasthan, India, and “Honorary Visiting Scientist” at RMIT University, Australia. He has over 10 years of research, teaching, and administrative experiences in various international organizations. Dr. Daima has significant expertise in designing nanoparticles with controlled physicochemical properties, and his research findings have revealed guiding principles involved in rational nanoparticle design approaches for biomedical applications. His research focuses on engineering the functional nanomaterials, controlling nano-bio interfacial interactions, and biomedical devices. He is Editorial Board Member and Reviewer of leading international publishers in the field of nanotechnology, nanotoxicology, and nanomedicine, with >39 peer-reviewed, high-impact publications to date. He has presented his research worldwide, and he is Member of several scientific/professional bodies. He is Recipient of numerous international fellowships/awards and has established Nano-Bio Interfacial Research Laboratory (NBIRL) to undertake high-quality fundamental and applied research. He obtained MSc (Biotechnology) from the University of Rajasthan, India, and PhD (Nanobiotechnology) from RMIT University, Australia.



Navya PN is working as Assistant Professor at Siddaganga Institute of Technology, India, and moving to the University of New South Wales, Australia, as a Research Fellow. She holds MTech degree from Manipal University, India. Her research interests are development of biocompatible nanoparticles with suitable functionalization for a range of biomedical, environmental, and industrial applications. She has published several high-impact research papers in the journals of international repute. She is Cofounder of Nano-Bio Interfacial Research Laboratory (NBIRL). She is also member of several professional bodies, Editor of *Nanoscience in Medicine* (book of Springer Nature), and Reviewer for prestigious journals in the field of nanotechnology. She is Recipient of numerous international fellowships/awards including Sakura Exchange Fellowship in Science from JST, Japan, and research fellowship from UNSW Sydney, Australia.



Nandita Dasgupta has completed her BTech and PhD from VIT University, Vellore, India, and is an Elected Fellow (FBSS) of Bose Science Society. She has major working experience in micro-/nanoscience and is currently working as Assistant Professor at the Department of Biotechnology, Institute of Engineering and Technology, Lucknow, India. Earlier at LV Prasad Eye Institute, Bhubaneswar, India, she has worked on mesenchymal stem cell-derived exosomes for the treatment of uveitis. She has exposure of working at university, research institutes, and industries including VIT University, Vellore, Tamil Nadu, India; CSIR-Central Food Technological Research Institute, Mysore, India; Uttar Pradesh Drugs and Pharmaceutical Co. Ltd., Lucknow, India; Indian Institute of Food Processing Technology (IIFPT), Thanjavur; and Ministry of Food Processing Industries, Government of India. At IIFPT, Thanjavur, she was involved in a project funded by a leading pharmaceutical company, Dr. Reddy's Laboratories, and has successfully engineered micro-vehicles for model drug molecules. Her areas of interest include micro-/nanomaterial fabrication and its applications in various fields – medicine, food, environment, and biomedical agriculture.

She has published 13 edited books and 1 authored book with Springer, Switzerland. She is an Associate Editor of *Environmental Chemistry Letters* – a Springer journal with an impact factor of 3.2.



Shivendu Ranjan has completed his BTech and PhD in Biotechnology from VIT University, Vellore, India, and has expertise in nano(bio)technology and is an Elected Fellow of Bose Scientific Society (FBSS). He is currently working as Head, Research & Technology Development at E-Spin Nanotech Pvt. Ltd., SIDBI Center, Indian Institute of Technology, Kanpur, India. After joining E-Spin Nanotech, IIT Kanpur, he has successfully developed prototypes for many products and three patents. He is also serving as a Senior Research Associate (Adjunct) at Faculty of Engineering & Built Environment, University of Johannesburg, Johannesburg, South Africa. He is also mentoring Atal Innovation Centre, Bhubaneswar, Odisha, giving his technical inputs to the centre. Atal Innovation Centre is the part of Atal Innovation Mission of the NITI Aayog, Govt of India. He is also Reviewer of Iran National Science Foundation (INSF), Tehran, Iran, and Jury at Venture Cup, Denmark. He had founded and drafted the concept for the first edition of the “VIT Bio Summit” in 2012, and the same has been continued till date by the university. He has worked in CSIR-CFTRI, Mysuru, India, as well as UP Drugs and Pharmaceutical Co. Ltd., India, and IIFPT, Thanjavur, MoFPI, Government of India. At IIFPT, Thanjavur, he was involved in a project funded by a leading pharmaceutical company, Dr. Reddy’s Laboratories, and has successfully engineered micro-vehicles for model drug molecules.

His research interests are multidisciplinary and include: micro-/nanobiotechnology, nano-toxicology, environmental nanotechnology, nanomedicine, and nanoemulsions. He is an Associate Editor of *Environmental Chemistry Letters* – a Springer journal. He has published six edited books and one authored book with Springer, Switzerland. He has published many scientific articles in international peer-reviewed journals and has authored many book chapters as well as review articles. He has received several awards and recognitions from different national and international organizations.



Eric Lichtfouse PhD, born in 1960, is an Environmental Chemist working at the University of Aix-Marseille, France. He has invented carbon-13 dating, a method allowing to measure the relative age and turnover of molecular organic compounds occurring in different temporal pools of any complex media. He is teaching scientific writing and communication, and has published the book *Scientific Writing for Impact Factors*, which includes a new tool – the micro-article – to identify the novelty of research results. He is Founder and Chief Editor of scientific journals and series in environmental chemistry and agriculture. He founded the European Association of Chemistry and the Environment. He received the Analytical Chemistry Prize by the French Chemical Society, the Grand Prize of the Universities of Nancy and Metz, and a Journal Citation Award by the Essential Indicators.

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