

Contents

Contributing authors — VII

Anjali Bedse, Shilpa Raut, Varsha Tambe, Sachin Kothawade,
and Vishal Pande

Chapter 1

Introduction to mesoporous silica nanoparticles (MSNs) — 1

Rajashri B. Sumbe, Kunal G. Raut, Ashwini R. Gawade, Amruta A. Bankar,
Kalyani A. Autade, and Sachin N. Kothawade

Chapter 2

Synthesis of mesoporous silica nanoparticles — 23

Vishal Gurumukhi, Anil Pawar, Rashmi Tambare, Pankaj Dangre,
and Ganesh Tapadiya

Chapter 3

Characterization of mesoporous silica nanoparticles — 55

Om M. Bagade and Priyanka E. Doke-Bagade

Chapter 4

Drug delivery using mesoporous silica nanoparticles (MSNs) — 75

Sachin Kothawade, Vijaya Padwal, Prachi Kanawade, Poonam Inamdar

Chapter 5

Catalytic applications of MSNs — 97

Prakash N. Kendre, Ajinkya P. Pote, Shirish Jain, Dhiraj R. Kayande

Chapter 6

Sensing and biosensing with mesoporous silica nanoparticles (MSNs) — 119

Sachin Kothawade, Vijaya Padwal

Chapter 7

Biomedical applications of MSNs — 145

Kuldeep Vinchurkar, Ankita Bhadoriya, Sheetal Mane

Chapter 8

Environmental and sustainability applications — 169

Bhushan R. Rane, Vaibhav L. Patil, Nandini R. Mhatre, Aditi P. Padave,
Nikita P. Mane, Mayur R. Gavit, Sachin N. Kothawade, and Ashish S. Jain

Chapter 9

Recent advances in mesoporous silica nanoparticles research — 187

Hemant Singh, Zenab Darban, Aya Ayman Nasser, Showkeen Muzamil Bashir,
Huseyin Avci, Syed Shahabuddin, Mehdi Esfandyari-Manesh, and Shabir Hassan

Chapter 10

Characterization techniques for advanced research — 243

Prashant Patil, Sandesh Bole, Sachin Kothawade, Jayprakash Suryawanshi,
Vishal Pande

Chapter 11

Industrial production and commercialization of MSNs — 273

Index — 303