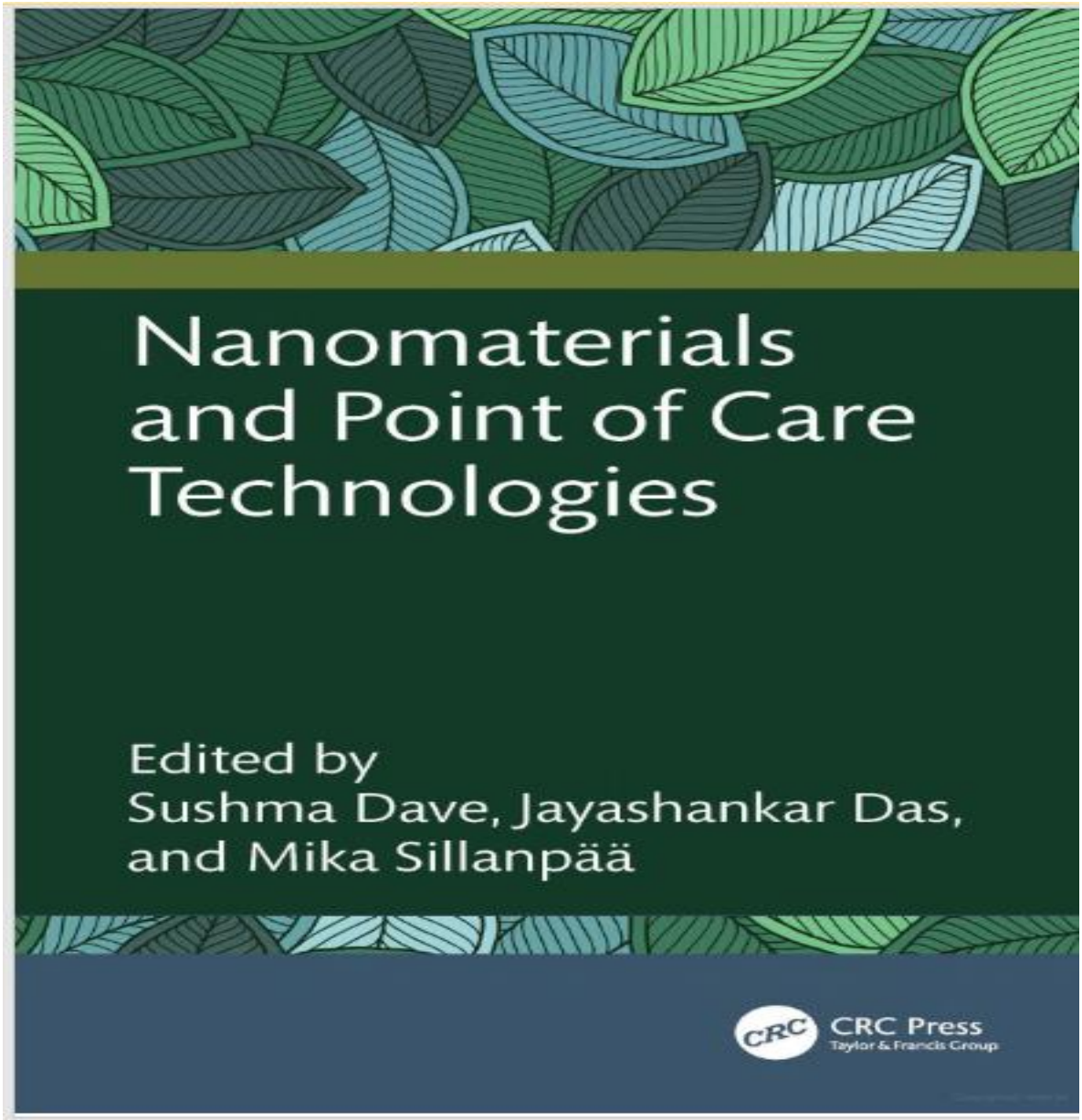
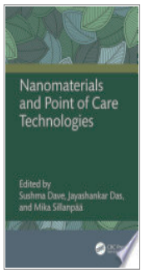



## Nanomaterials and Point of Care Technologies




Sushma Dave, Jayashankar Das, Mika Sillanpää

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Point of care (POC) diagnostic devices are predominantly used for the diagnosis and monitoring of diseases. To make these technologies scalable for manufacturing, user-friendly, inexpensive, sensitive, and rapid, a combination of such devices with nanomaterials is required. This book deals with new emerging fields such as POC technologies and advanced nanotheranostics using nanomaterials and their technologies and applications in diagnosis. In this book, current advances for the application of nanomaterials such as carbon nanotubes, graphene, and magnetic nanoparticles in POC devices and future directions are reviewed.

This book:

- Presents a comprehensive account of needs and challenges of POC diagnostics
- Describes the fundamentals of rationale of nanomaterials as remarkable building blocks for biosensing
- Discusses development of critical diagnosis in POC systems
- Deals with the advantages of nanomaterial-based sensing strategies
- Illustrates the challenges and breakthroughs of technologies for cost-efficient biosensing platform

The book is aimed at researchers and professionals in nanotechnology and biomedical engineering.

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# 7 Carbon Nanobots as Biosensors for Infectious Diseases

*Medha Pandya, Urja Desai, and Shreya Modi*

## 7.1 INTRODUCTION

Despite the advancement in medical sciences, some diseases like cancer [1,2], diabetes, some infectious diseases, autoimmune diseases [3], and chronic pain have not been treated efficiently due to lack of proper diagnosis and treatment techniques [4]. One of the most dangerous causes of illnesses in humans today is emerging pathogenic bacteria and viruses. Infectious illnesses (like coronavirus disease 2019) are a significant threat to worldwide public health. Early detection of infectious disease can help patients' conditions be effectively controlled and treated. Because of this, the invention of novel diagnostic technology that is high-throughput, ultra-sensitive, and cost-effective has become a popular research area. The creation of detection systems utilizing complicated materials is a difficult but essential area of investigation for illness diagnosis due to the discovery of novel materials and the viability of processing and modification. Any global health system that promotes health care entails the diagnosis, treatment, and prevention of any human disease [5]. Through point-of-care (POC) technology, which helps with better on-site diagnostics, it has been continuously improved. POC testing implies that every test can be performed at or close to the location of patient care [6]. Nanotechnology has been proved as an efficient technology and widely exploited in recent times for the different medical and diagnosis applications. Different areas of diagnosis, medicine, and treatment have also focused on the use of nano-derived products [7]. With the determination of the biocompatibility of nanomaterials within the immune system it is widely fulfilled according to their surface chemistry. Recently, nanotechnology is widely applied to enhance targeted immune responses to the prevention and treatment of a number of infectious and non-infectious diseases [8]. The notion of nanomaterials has been adopted by science as a result of the connection between medical diagnostics, therapies, and monitoring with nanorobots [9]. Researchers in molecular biology, chemistry, medicine, math, engineering, and computer science all work in the field of nanotechnology, which is vastly multidisciplinary and involves many analytical hurdles. Carbon nanomaterials (CNs) are promising for multiple biological applications due to their structural variety, large surface area-to-volume

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