

Edible Electronics

Principles, Fundamentals, and Applications in Smart Food Packaging and Biomedical Innovations

Edible Electronics: Principles, Fundamentals, and Applications in Smart Food Packaging and Biomedical Innovations addresses the growing global demand for sustainable technologies and environmentally responsible solutions. Conventional electronic devices often rely on toxic, non-biodegradable materials that contribute significantly to electronic waste, posing environmental and health risks, particularly in developing regions and areas with limited waste management systems. By introducing the concept of edible electronics and emphasizing the use of biocompatible and biodegradable materials, this book highlights innovative approaches to reducing electronic waste and mitigating the effects of environmental degradation. It advocates the adoption of sustainable technological practices that can support the needs of an expanding global population while promoting both human and environmental well-being. The book provides a comprehensive exploration of edible electronic materials, including conductors, dielectrics, and semiconductors, and examines their integration into functional electronic systems. It discusses the development of sensors for both in-body and external applications, along with energy storage and supply systems such as batteries and supercapacitors. In addition, the text covers advanced communication methods, including radio-frequency, intra-body, and optical technologies, demonstrating the broad potential of edible electronics across food packaging, healthcare, and biomedical applications. A detailed overview of fabrication techniques is also presented, including deposition, filming, patterning, printing, and carbonization processes. These methods are examined with an emphasis on ensuring the safety, performance, and reliability of edible electronic systems. Furthermore, the book explores regulatory considerations, safety standards, and environmental impacts associated with the development and deployment of such technologies.



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