1. Record Nr. UNINA9910877813803321 Autore Altalhi Tariq Titolo Toxic Effects of Micro- and Nanoplastics: Environment, Food and Human Health Pubbl/distr/stampa Newark:,: John Wiley & Sons, Incorporated,, 2024 ©2024 **ISBN** 9781394238163 1394238169 9781394238149 1394238142 Edizione [1st ed.] Descrizione fisica 1 online resource (604 pages) Altri autori (Persone) FernandesVirgínia Cruz Soggetti Microplastics **Environmental aspects** Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Nota di contenuto Cover -- Series Page -- Title Page -- Copyright Page -- Contents --Preface -- Chapter 1 Aging Process of Microplastics in the Environment -- 1.1 Introduction -- 1.2 Impact of MPs on the Environment -- 1.3 Pristine and Aged Microplastics -- 1.4 Influence of Aging Processes in the Properties of MPs -- 1.4.1 Physical Properties -- 1.4.2 Chemical Properties -- 1.5 Simulation in the Laboratory of the Different Aging Effects -- 1.5.1 Radiation -- 1.5.2 Chemical Oxidation and Advanced Oxidation Process (AOP) -- 1.5.3 Mechanical Stress -- 1.5.4 Biodegradation -- 1.6 Conclusion -- Acknowledgments -- References -- Chapter 2 Life Cycle Assessment (LCA) of Bioplastics -- 2.1 Introduction -- 2.1.1 Life Cycle Assessment -- 2.1.2 Specialized LCA Software -- 2.2 Purpose and Approach of this Chapter -- 2.3 Development of Life Cycle Assessments for Bioplastics -- 2.3.1 Functional Unit and Scope Definition -- 2.3.2 Conventional Plastics vs. Bioplastics Analyses -- 2.3.3 Primary Applications for Which LCA was Performed -- 2.3.4 Evaluation Methods and Impact Categories Analyzed -- 2.3.5 End of Life (EoL) Scenarios -- 2.4 Discussion --

2.4.1 Evaluation Methods and Impact Categories -- 2.4.2 End of Life

(EoL) -- 2.5 Concluding Remarks -- References -- Chapter 3 Microand Nanoplastics-An Invisible Threat to Human Health -- 3.1 Introduction -- 3.2 Routes of Exposure -- 3.2.1 Inhalation -- 3.2.2 Dermal Contact -- 3.2.3 Ingestion -- 3.3 Phenomenon of Microplastics in Nourishment and Nutrients -- 3.3.1 Sodium Chloride -- 3.3.2 Marine Organisms (Crawfish, Mussel, Oyster): Techniques Used for Microplastic Identification -- 3.3.3 Canned and Prepackaged Foods --3.3.4 Soil Biome -- 3.4 Impact of Microplastics and Nanoplastics on Mammalian Health -- 3.5 Nanoplastics and Microplastics: Effects on Environment and Marine Life -- 3.6 Conclusions -- Acknowledgments. Conflict of Interest -- References -- Chapter 4 Microplastics and Nanoplastics and Related Chemicals: The Physical-Chemical Interactions -- 4.1 Introduction to Micro- and Nanoplastics -- 4.2 Sources and Distribution of Micro- and Nanoplastics -- 4.3 Ecological Impacts of Micro- and Nanoplastics -- 4.4 Food Contamination and Human Exposure to Micro- and Nanoplastics -- 4.5 Toxicological Effects of Micro- and Nanoplastics on Human Health -- 4.5.1 Sources and Routes of Exposure -- 4.5.1.1 Ingestion -- 4.5.1.2 Inhalation --4.5.1.3 Dermal Exposure -- 4.5.2 Toxicological Effects -- 4.5.2.1 Inflammation and Immune Response -- 4.5.2.2 Genotoxicity and Carcinogenicity -- 4.5.2.3 Endocrine Disruption -- 4.6 Conclusions and Recommendations for Mitigating the Toxic Effects of Micro- and Nanoplastics -- 4.6.1 Reduce Plastic Production and Use -- 4.6.2 Improving Waste Management -- 4.6.3 Enhance Public Awareness --4.6.4 Develop and Implement Testing Protocols -- 4.6.5 Future Research -- References -- Chapter 5 Microplastics and Nanoplastics: Sources, Distribution, Behaviors, and Fate -- List of Abbreviations --5.1 Micro- and Nanoplastics: Principles and Sources -- 5.2 Micro- and Nanoplastic Behavior -- 5.2.1 Physiochemical Properties of MNPs: Toxicity and Reactivity -- 5.2.1.1 Petrochemical-Based Plastics --5.2.1.2 Bio-MNPs as a New Cause of Concern -- 5.2.1.3 Biological and Environmental Hazards of MNPs: The Effects on Biodiversity -- 5.3 Micro- and Nanoplastics' Distribution and Fate: From Terrestrial and Aguatic Environments to the Human Body -- 5.3.1 Terrestrial Environments -- 5.3.2 Aquatic Environments -- 5.3.3 Air and Atmosphere -- 5.3.4 Wastewater Treatment Plants -- 5.3.5 Cells and Organs -- 5.4 The Effect of Abiotic and Biotic Factors on MNPs' Behavior and Fate -- 5.5 Conclusions and Future Perspectives --References.

Chapter 6 Microplastics and Nanoplastics in Food -- 6.1 Introduction -- 6.2 Sources of Micro-Nanoplastics Affecting Food -- 6.2.1 Micro-Nanoplastics in Seafood -- 6.2.2 Micro-Nanoplastics in Water and Beverages -- 6.2.3 Micro-Nanoplastics in Meat -- 6.2.4 Micro-Nanoplastics in Fruits and Vegetables -- 6.2.5 Micro-Nanoplastics in Other Food Sources -- 6.3 Impact of Micro-Nanoplastics -- 6.4 Direct Impact on Human Health -- 6.4.1 Oxidative Stress and Apoptosis --6.4.2 Autophagy -- 6.4.3 Damage to Different Body Cells -- 6.4.4 Inflammation -- 6.5 Affecting the Food Chain -- 6.6 Detection of Micro-Nanoplastics in Food -- 6.7 Conclusion -- References --Chapter 7 Microplastics: Properties, Effect on the Environment and Removal Methods -- 7.1 An Insight Into Microplastics (MPs) -- 7.2 Microplastic Definitions -- 7.3 Properties of MPs -- 7.4 Primary and Secondary Microplastics -- 7.5 Microbeads -- 7.6 Impacts of MPs --7.6.1 Ecological Impacts -- 7.6.2 Chemical Impacts -- 7.6.3 Socio-Economic Impact -- 7.6.4 Removal of MPs -- 7.6.5 Chemical Method -- 7.6.6 Absorption and Filtration -- 7.6.7 Biological Method of Removal of MPs -- 7.7 Global Initiatives -- 7.7.1 United Nations Sustainable Development Goal (SDG 14) -- 7.8 Conclusion --

Introduction -- 8.1.1 Water Consumption Around the World -- 8.1.2 Water in the Beverage Industry -- 8.1.3 Water Quality and Water Pollution -- 8.2 Methodology -- 8.3 Results -- 8.3.1 Countries where Studies were Performed -- 8.3.2 Techniques for Identification and Extraction of Microplastics -- 8.3.2.1 Selection of the Type of Beverages -- 8.3.2.2 Sample Preparation -- 8.3.2.3 Digestion --8.3.2.4 Filtration -- 8.3.2.5 Visual Identification and Characterization. 8.3.2.6 Quality Control and Contamination Prevention -- 8.4 Microplastic Concentrations in Beverages -- 8.5 Microplastic Characterization in Beverages -- 8.5.1 Microplastic Sizes -- 8.5.2 Microplastic Types -- 8.5.3 Microplastic Colors -- 8.5.4 Microplastic Chemical Composition -- 8.6 Human Exposure -- 8.7 Conclusions --References -- Chapter 9 Microplastics and Nanoplastics in Terrestrial Systems -- 9.1 Introduction -- 9.2 Micro/Nanoplastics in Soil -- 9.2.1 Source of Micro/Nano Plastics in Soils -- 9.2.2 Effect of Micro/Nanoplastics -- 9.2.2.1 Effect of Micro/Nanoplastics on the Physical and Chemical Properties of Soil -- 9.2.2.2 Effect of Micro/Nanoplastics on Soil Microorganisms -- 9.2.2.3 Effect of Micro/Nanoplastics on Soil Fauna -- 9.2.3 Degradation and Transport of Micro/Nanoplastics -- 9.3 Micro/Nanoplastics in Plants -- 9.3.1 Source of Micro/Nanoplastics -- 9.3.1.1 Plastic Mulching -- 9.3.1.2 Packaging -- 9.3.1.3 Irrigation Water -- 9.3.1.4 Sewage Treatment Plants (STPs) -- 9.3.1.5 Wastewater Treatment Plant (WWTP) -- 9.3.1.6 Air-Borne -- 9.3.1.7 Others -- 9.3.2 Migration or Uptake of Micro/Nanoplastics From Soil and Atmosphere -- 9.3.2.1 Uptake Pathways of Micro/Nanoplastics -- 9.3.3 Accumulation and Translocation -- 9.3.4 Effect of Micro- and Nano Plastics -- 9.3.4.1 Inhibitory Effect -- 9.3.4.2 Blocking Pores or Light -- 9.3.4.3 Mechanical Damage to Roots -- 9.3.4.4 Hindering Gene Expression --9.3.4.5 Release of Additives -- 9.3.4.6 Adsorption or Transport of Contaminant -- 9.3.4.7 Alteration of Soil Properties -- 9.3.4.8 Effect on Soil Microbes -- 9.3.4.9 Stimulatory Effect -- 9.3.4.10 Soil Microbial Community and Root Symbionts -- 9.4 Micro/Nanoplastics in Terrestrial Organism -- 9.4.1 Effect of Micro/Nanoplastics on Terrestrial Living Things -- 9.4.1.1 Ingestion -- 9.4.1.2 Gastrointestinal Tract. 9.4.1.3 Microplastics on Respiratory Pathways -- 9.4.1.4 Interaction of Microplastics on Gut Microbiota -- 9.4.1.5 Endocrine System -- 9.5 Conclusion -- References -- Chapter 10 Microplastics in Cosmetics and Personal Care Products -- 10.1 Introduction -- 10.1.1 Personal Care Products (PCPs) and Cosmetics -- 10.1.1.1 Consumption and Categorization -- 10.1.1.2 Microbeads in PCPs and Cosmetics --10.1.1.3 Environmental Effects of Microplastics -- 10.2 Methodology --10.3 Results -- 10.4 Characterization of Microplastics in PCPs and Cosmetics -- 10.4.1 Types of Samples -- 10.4.2 Per Country of Origin -- 10.4.3 Forms of Microplastics -- 10.4.4 Colors of Microplastics Found in PCPs and Cosmetics -- 10.4.5 Sizes of Microplastics -- 10.4.6 Types of Polymers -- 10.4.7 Experimental Methods Used to Extract and Analyze Microplastics -- 10.4.7.1 Extraction Method -- 10.4.7.2 Particle Size Analysis Method -- 10.4.7.3 Polymer Type Analysis Methods -- 10.5 Interaction Between Microplastics from PCPs and Other Substances -- 10.6 Toxicity of Microplastics from Personal Care Products and Cosmetics -- 10.6.1 Toxicity of Different Types of MP --10.6.2 Effects in Different Organism's Groups -- 10.6.2.1 Bacteria --10.6.2.2 Plants -- 10.6.2.3 Phytoplankton -- 10.6.2.4 Algae --10.6.2.5 Animals -- 10.6.2.6 Humans (Cells) -- 10.7 Worldwide Bans

References -- Chapter 8 Identification, Quantification, and Presence of Microplastics and Nanoplastics in Beverages Around the World -- 8.1

on Microbeads in PCPs and Cosmetics -- 10.8 Conclusions -- References -- Chapter 11 Study on Microplastic Content in Cosmetic Products and Their Detrimental Effect on Human Health -- 11.1 Introduction -- 11.2 Cosmetic Products in India -- 11.3 Source of Plastics and Microplastics -- 11.4 Uptake and Bio-Accumulation of Microplastics -- 11.5 Effect of Microplastic Exposure on Human Health -- 11.5.1 Oxidative Stress and Apoptosis -- 11.5.2 Inflammation -- 11.5.3 Metabolic Homeostasis.

11.6 Alternatives of Microplastics in Cosmetic Products.

Sommario/riassunto

This comprehensive volume examines the toxic effects of micro- and nanoplastics on the environment, food, and human health. Edited by Inamuddin, Tariq Altalhi, and Virgínia Cruz Fernandes, it provides an in-depth exploration of the sources, distribution, and behavior of these plastics, as well as their interactions with related chemicals. The book covers the environmental aging processes of microplastics, life cycle assessments of bioplastics, and the various routes of human exposure. It addresses the direct and ecological impacts on health, the food chain, and marine life, while also discussing the detection and removal methods of microplastics. Aimed at researchers, environmental scientists, and policymakers, this work seeks to raise awareness and propose strategies for mitigating the harmful effects of micro- and nanoplastics.