



Radionuclides and Heavy Metals in Environment

Edited by

Marina V. Frontasyeva, Vladimir P. Perelygin
and Peter Vater

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Radionuclides And Heavy Metals In Environment

**Lawrence K. Wang, Yung-Tse Hung, Mu-
Hao Sung Wang, Jiaping Paul Chen**

Radionuclides And Heavy Metals In Environment:

Radionuclides and Heavy Metals in Environment Marina V. Frontasyeva, Vladimir P. Perelygin, Peter Vater, 2001-09-30 Proceedings of the NATO Advanced Research Workshop on Monitoring and Man Made Radionuclides and Heavy Metals Waste in Environment Dubna Russia 3 6 October 2000 **Radionuclides and Heavy Metals in Environment** Marina Marinova, Vladimir P. Perelygin, Peter Vater, 2012-12-06 This volume entitled Radionuclides and Heavy Metals in Environment contains the Proceedings of the NATO Advanced Research Workshop ARW Monitoring of Natural and Man Made Radionuclides and Heavy Metal Waste in Environment that was held at the Joint Institute for Nuclear Research JINR Dubna Russia from 3 October to 6 October 2000 Originally it was planned to held the ARW in 1999 the year when NATO was celebrating its 50th anniversary Few days before opening it had to be postponed because of problems in issuing visa for all the colleagues who intended to participate The ARW was organized and conducted by the co directors Prof Vladimir P Perelygin Joint Institute for Nuclear Research Dubna Russia and Dr Peter Vater Philipps Universitat Marburg Germany The JINR was chosen as the host institute of ARW because of the lack of contact and real co operation between the former Soviet Union FSU countries specialists in ecology and their Western well experienced colleagues The selection of this location and supplementary funds provided by Russian Foundation on Basic Research Moscow Russia and the JINR Dubna Russia made it possible to attain a rather large number of participants and observers from FSU countries The JINR provided to all the participants of the workshop an effective car minibus transportation Moscow Dubna Moscow and a rather good accommodation in Dubna *Phyto and Microbial Remediation of Heavy Metals and Radionuclides in the Environment* Rym Salah-Tazdaït, Djaber Tazdaït, 2022-02-24 This book examines the role that bioremediation can play in the detoxification of soil water and air to improve environmental and human health with a specific focus on heavy metals and radionuclides Environmental pollution whether by natural or human causes with industrial activities being a key player is a challenge facing all nations across the world While treatment has typically required the use of expensive technology one promising solution is the use of phytoremediation in which plants act by metabolizing or sequestering pollutants This eco friendly solution is a good alternative to the standard methods of soil and water treatments This book provides not only the basic definitions and classification of technologies used for contaminant remediation but also the most recent studies dealing with the selection of new promising microbial stains and plant varieties involved in the treatment of radioactive and heavy metal contaminants It provides a detailed description of the biochemical mechanisms and genes involved in the bioremediation of radionuclides and heavy metals offering a clear insight for academics and practitioners interested in in vitro and in situ biological treatment This book will be of great value to students and scholars interested in environmental pollution and environmental health from across a range of different disciplines including environmental microbiology and chemistry ecology and environmental science biological and environmental engineering and biotechnology **Control of Heavy**

Metals in the Environment Lawrence K. Wang, Yung-Tse Hung, Mu-Hao Sung Wang, Jiaping Paul Chen, 2025-03-21 Offering broad coverage of advanced principals and applications Control of Heavy Metals in the Environment series provides chemical and environmental engineers with the most complete resource available on the treatment of heavy metal contaminants with an emphasis on advanced and alternative approaches It investigates a variety of environmental pollution sources and waste characteristics that require a multitude of remediation methods It covers metal oxide nanoparticle pollution and nanotechnology applications for remediation The authors delve into costs and effluent standards and offer several illustrative case histories to illustrate the regional and global effects of key pollution control practices Features Provides technical information for industrial and hazardous waste treatment Explores the newest methods of clean production and waste minimization Covers topics related to environmental geochemistry Includes numerous figures tables examples and case histories

Phyto and Microbial Remediation of Heavy Metals and Radionuclides in the Environment Rym Salah-Tazdaït, Djaber Tazdaït, 2022 This book examines the role that bioremediation can play in the detoxification of soil water and air to improve environmental and human health with a specific focus on heavy metals and radionuclides Environmental pollution whether by natural or human causes with industrial activities being a key player is a challenge facing all nations across the world While treatment has typically required the use of expensive technology one promising solution is the use of phytoremediation in which plants act by metabolising or sequestering pollutants This eco friendly solution is a good alternative to the standard methods of soil and water treatments This book provides not only the basic definitions and classification of technologies used for contaminant remediation but also the most recent studies dealing with the selection of new promising microbial stains and plant varieties involved in the treatment of radioactive and heavy metals contaminants It provides a detailed description of the biochemical mechanisms and genes involved in the bioremediation of radionuclides and heavy metals offering a clear insight for academics and practitioners interested in in vitro and in situ biological treatment This book will be of great interest to students and scholars interested in environmental pollution and environmental health from across a range of different disciplines including environmental microbiology and chemistry ecology and environmental science biological and environmental engineering and biotechnology

Emerging Nanomaterials for Recovery of Toxic and Radioactive Metal Ions from Environmental Media Xiangke Wang, 2021-11-26 Emerging Nanomaterials for Recovery of Toxic and Radioactive Metal Ions from Environmental Media covers nanomaterials used in the environmental remediation of sites contaminated by toxic or radioactive heavy metals The book comprehensively covers the use of MOF based nanomaterials COF based nanomaterials MXene based nanomaterials nZVI based nanomaterials and carbon based nanomaterials in remediation techniques and details the main interaction mechanisms between toxic radioactive metal ions and the described novel nanomaterials through kinetic analysis thermodynamic analysis spectroscopic techniques and theoretical calculations It provides a thorough reference on the use of

the described novel nanomaterials for academics researchers and advanced postgraduates in the environmental sciences and environmental chemistry Provides a comprehensive and systematic reference on various novel nanomaterials that are available for use in the treatment of heavy metal ions and radioactive wastes Presents the latest knowledge on the interaction of toxic and radioactive metal ions with novel nanomaterials including how to choose different materials for specific uses Covers the principles and functionalization of nanomaterials in environmental remediation enabling an understanding of methodologies and best choice in nanomaterials

Radionuclides in the Environment Clemens Walther, Dharmendra K. Gupta, 2015-10-30 This book provides extensive and comprehensive information to researchers and academicians who are interested in radionuclide contamination its sources and environmental impact It is also useful for graduate and undergraduate students specializing in radioactive waste disposal and its impact on natural as well as manmade environments A number of sites are affected by large legacies of waste from the mining and processing of radioactive minerals Over recent decades several hundred radioactive isotopes radioisotopes of natural elements have been produced artificially including ^{90}Sr ^{137}Cs and ^{131}I Several other anthropogenic radioactive elements have also been produced in large quantities for example technetium neptunium plutonium and americium although plutonium does occur naturally in trace amounts in uranium ores The deposition of radionuclides on vegetation and soil as well as the uptake from polluted aquifers root uptake or irrigation are the initial point for their transfer into the terrestrial environment and into food chains There are two principal deposition processes for the removal of pollutants from the atmosphere dry deposition is the direct transfer through absorption of gases and particles by natural surfaces such as vegetation whereas showery or wet deposition is the transport of a substance from the atmosphere to the ground by snow hail or rain Once deposited on any vegetation radionuclides are removed from plants by the airstream and rain either through percolation or by cuticular scratch The increase in biomass during plant growth does not cause a loss of activity but it does lead to a decrease in activity concentration due to effective dilution There is also systemic transport translocation of radionuclides within the plant subsequent to foliar uptake leading the transfer of chemical components to other parts of the plant that have not been contaminated directly

Environmental Contamination Jatin Srivastava, 2012-02-29 Nature minimizes the hazards while man maximizes them This is not an assumption but a basic idea of the findings of scientists from all over the world The last two centuries have witnessed the indiscriminate development and overexploitation of natural resources by man causing alterations and impairment of our own environment Environmental contamination is the result of the irrational use of resources at the wrong place and at the wrong time Environmental contamination has changed the lifestyle of people virtually all over the world and has reduced the extent of life on earth Today we are bound to compromises with such environmental conditions which was not anticipated for the sustenance of humanity and other life forms Let us find out the problem and its management within this book

Microbiome-Based Decontamination of Environmental Pollutants Ajay

Kumar,Joginder Singh Panwar,Lucas Carvalho Basilio de Azevedo,2024-04-04 Microbiome Based Decontamination of Environmental Pollutants explores the complex interactions of plant associated microbiomes providing insights into the pressing challenges of managing environmental resources such as soil water and waste Analysis has shown a formidable potential based in the network interactions between plant microbiota and environmental contaminants This book presents insights into the potential exploitation of these plant associated microbial functions This volume in the Plant and Soil Microbiome series summarizes microbiological aspects of environmental management from the basics to advanced theoretical as well as practical aspects of microbial based approaches The physical and chemical changes caused by pollution of an ecosystem can occur rapidly significantly impacting the functionality of ecosystem services in that environment Environmental contamination poses and increasingly global challenge through direct and indirect adverse impacts on the climate soil productivity and the health concerns of human beings Traditional remediation techniques are not consistently feasible in mitigating environmental contaminants challenges in terms of cost effectiveness limited land resources and toxic residual products The use of plant associated microbes as part of a network of tools opens a new door to explore an alternative eco friendly and economical technology to mitigate the challenges of environmental contamination Explores the emerging plant microbe interactive nexus for contaminants degradation Presents insights into the production and commercialization of plant microbiome based enzymes Includes engineered microbes and microbial products application in contaminant management Highlights the latest omics and technologies used in plant soil microbiome in contaminant management

Handbook of Environmental and Ecological Modeling Sven E. Jorgensen,2017-11-22 With descriptions of hundreds of the most important environmental and ecological models this handbook is a unique and practical reference source The Handbook of Environmental and Ecological Modeling is ideal for those working in environmental modeling including regulators and managers who wish to understand the models used to make assessments Overviews of more than 360 models are easily accessed in this handbook allowing readers to quickly locate information they need about models available in a given ecosystem The material in the Handbook of Environmental and Ecological Modeling is logically arranged according to ecosystem Each of the sixteen chapters of the handbook covers a particular ecosystem and includes not only the descriptions of the models but also an overview of the state of the art in modeling for that particular ecosystem A summary of the spectrum of available models is also provided in each chapter The extensive table of contents and the easy to use index put materials immediately at your fingertips

Radionuclide Contamination and Remediation Through Plants

Dharmendra Kumar Gupta,Clemens Walther,2014-07-14 This book focuses on the mechanistic microscopic understanding of radionuclide uptake by plants in contaminated soils and potential use of phytoremediation The key features concern radionuclide toxicity in plants how the radioactive materials are absorbed by plants and how the plants cope with the toxic responses The respective chapters examine soil classification natural plant selection speciation of actinides kinetic modeling

and case studies on cesium uptake after radiation accidents Radionuclide contaminants pose serious problems for biological systems due to their chemical toxicity and radiological effects The processes by which radionuclides can be incorporated into vegetation can either originate from activity interception by external plant surfaces either directly from the atmosphere or from resuspended material or through uptake of radionuclides via the root system Subsequent transfer of toxic elements to the human food chain is a concrete danger Therefore the molecular mechanisms and genetic basis of transport into and within plants needs to be understood for two reasons The effectiveness of radionuclide uptake into crop plants so called transfer coefficient is a prerequisite for the calculation of dose due to the food path On the other hand efficient radionuclide transfer into plants can be made use of for decontamination of land so called phytoremediation the direct use of living green plants for in situ removal of pollutants from the environment or to reduce their concentrations to harmless levels Heavy Metals In The Environment Bibudhendra Sarkar,2002-03-21 This text presents contemporary analytical techniques for the determination of heavy metals in air particles water soil and biological samples It details experimental studies to reduce the occurrence of disease remediate contaminated sites and establish acceptable range of oral intakes AROI guidelines

Removal of Emerging Contaminants Through Microbial Processes Maulin P Shah,2020-10-14 The abundance of organic pollutants found in wastewater affect urban surface waters Traditional wastewater management technologies focus on the removal of suspended solids nutrients and bacteria however new pollutants such as synthetic or naturally occurring chemicals are often not monitored in the environment despite having the potential to enter the environment and cause adverse ecological and human health effects Collectively referred to as emerging contaminants they are mostly derived from domestic activities and occur in trace concentrations ranging from pico to micrograms per liter Environmental contaminants are resistant to conventional wastewater treatment processes and most of them remain unaffected causing contamination of receiving water This in turn leads to the need for advanced wastewater treatment processes capable of removing environmental contaminants to ensure safe fresh water sources This book provides an up to date overview of the current bioremediation strategies including their limitations challenges and their potential application to remove environmental pollutants It also introduces the latest trends and advances in environmental bioremediation and presents the state of the art in biological and chemical wastewater treatment processes As such it will appeal to researchers and policy makers as well as undergraduate and graduate environmental sciences students *Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (3rd Edition)* Mohamed Ksibi,Abdelazim Negm,Olf Hentati,Achraf Ghorbal,Arturo Sousa,Jesus Rodrigo-Comino,Sandeep Panda,José Lopes Velho,Ahmed M. El-Kenawy,Nicola Perilli,2024-05-03 This edited book includes over one hundred and eighty short papers that were presented during the third edition of EMCEI which was held in Sousse Tunisia in June 2021 Nowadays experts as well as most of the general public know that the Mediterranean and surrounding regions are facing environmental degradation that is accelerating at an unprecedented rate

The main causes are the natural and human induced climate change increasing pollution urban growth and the overexploitation and unsustainable use of resources due to rapid population growth The effects are seen in several indicators such as the warming more frequent extreme events severe droughts water shortages contraction of natural resources changes in land use and landscape deterioration decreasing agricultural yields biodiversity loss deterioration of the ecosystems corrosion of the natural coastal environment sea level rise and ocean acidification In addition to these more recent issues the Mediterranean and surrounding region naturally experience a number of hazards such as floods droughts desertification fires catastrophic forest diebacks earthquakes and volcanic eruptions By presenting a wide range of environmental topics and new findings relevant to a variety of problems in these regions this book appeals to anyone working in the subject area and especially students interested in learning more about new developments in environmental research initiatives in light of the worsening environmental degradation of the Mediterranean and surrounding areas making environmental and resource protection an increasingly important issue that impedes sustainable development and social well being The book addresses emerging environmental issues along with new challenges by focusing on innovative approaches that contribute to achieving a sustainable environment in and around the Mediterranean Sea and by highlighting to decision makers from relevant sectors the environmental considerations that should be integrated into their own activities

The Potential Use of Rock Phosphate in Sudan for Sustainable Agricultural Production Inaam Saad, 2022-01-25

Agriculture is primarily the uppermost important sector in Sudan contributing significantly to the country's national economy However in spite of the country's vast cultivated area productivity remains very low The declining agricultural production is indicative of the need for adopting sustainable agricultural development approaches to achieve country's food security The attainment of sustainable agricultural production will require the proper use of all available resources such as land water and mineral resources including the phosphate rock reserves Rock phosphate deposits of potential economic value occur at more than a hundred locations in sub Saharan African countries including Sudan Several geological surveys in Sudan have proven the occurrence of abundant resources of phosphate deposits in different locations in the country For advocating the initiation of rock phosphate mining and phosphate fertilizer industry in Sudan this book delivers sufficient and validated information on the underutilized resource of rock phosphate in Sudan and exposes its potential role in the development of sustainable agricultural production The book presents an accurate image of the current status and prospective scenario in relation to rock phosphate deposits and the potential establishment of the fertilizer industry in Sudan The book presents a comprehensive literature review on the history advantages and impacts of using rock phosphate It also sheds light on the rock phosphate deposits in Sudan their locations and geological and agricultural quality as compared to rock phosphate from other global resources The book presents two detailed case studies on assessing the agronomic value of Kurun and Uro rock phosphate rocks as fertilizers and their environmental impact assessment The book then highlights the potential benefits of

phosphate mining and the initiation of the phosphate fertilizer industry in Sudan proposes a plan for achieving that goal and presents recommendations to bring the Sudanese phosphate fertilizer industry to life Soils and the Environment Alan Wild, 1993-01-28 Geared to help students understand the ecological significance of soil this introduction to its general properties and processes includes an analysis of soil's role in supporting plant growth and maintaining a clean environment

Environmental Aspects of Stabilization and Solidification of Hazardous and Radioactive Wastes Pierre Côté, T. M.

Gilliam, 1989 **Plutonium and the Rio Grande** William L. Graf, 1994-12-29 The first atomic bombs were constructed at the Los Alamos National Laboratory where lab workers disposed of waste plutonium in nearby canyons leading to the Rio Grande Today the environmental consequences are just beginning to be understood as scientists examine the effects created by past mishandling of one of the most toxic chemical wastes known Written in an engaging accessible style *Plutonium and the Rio Grande* is the first book to offer a complete exploration of this environmental history It includes an explanation of what plutonium is how much of it was released by the Los Alamos workers and how much entered the river system directly from waste disposal and indirectly as a result of atomic bomb fallout The book includes extensive appendices maps diagrams and photographs Environmental managers ecologists hydrologists and other river specialists as well as concerned general readers will find the book readable and informative

Environmental Microbiology Maulin Shah, 2022-09-06 This book highlights the importance of various emerging technologies that are used to clean up the environment from pollution caused by human activities It assesses several existing applied and environmental microbiological techniques and introduces new technologies through applied aspects Select topics covered include municipal wastewater treatment environmental microorganisms metal pollutants in the environment and biogeochemical cycling

Environmental Remediation and Restoration of Contaminated Nuclear and Norm Sites L van Velzen, 2015-02-02 Nuclear sites become contaminated with radionuclides due to accidents and activities carried out without due consideration for the environment Naturally occurring radioactive materials NORM released by industrial processes such as coal power production and fertilizer manufacture may also require clean up Environmental remediation and restoration aim to reduce exposure to radiation from contaminated soil or groundwater This book provides a comprehensive overview of this area Part 1 provides an introduction to the different types of contaminated site and their characteristics Part 2 addresses environmental restoration frameworks and processes Part 3 then reviews different remediation techniques and methods of waste disposal Explores types and characteristics of contaminated nuclear and NORM sites Provides an in depth guide to environmental restoration frameworks and processes including stakeholder involvement risk assessment and cost benefit analysis in the remediation and restoration of contaminated nuclear and NORM sites Offers coverage of remediation techniques and waste disposal from electrokinetic remediation to in situ and ex situ bioremediation of radionuclides contaminated soils

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