Preface

Selenium (Se) is a naturally occurring, semimetallic trace element (Se; atomic number 34) that was discovered 200 years ago by the Swedish chemists Jöns Jakob Berzelius (1779–1848) and Johan Gottlieb Gahn (1745–1818). Since then, many studies have been published describing its chemical properties as well as its biological importance. Selenium, if present at trace concentration levels, is an essential nutrient in the diets of all living organisms; in excess, however, it is quite toxic.

On the occasion of the 200th anniversary of the discovery of selenium, the present Springer book entitled "Bioremediation of Selenium Contaminated Wastewater" summarizes the recent advances in this field. Selenium has emerged as a water treatment contaminant deriving from global industrial activities (i.e., coal and mineral mining, metal smelting, oil extraction and refining, and agricultural irrigation). Selenium can bioaccumulate in aquatic ecosystems and presents a source of toxicity for many organisms, including humans. However, selenium represents an extremely difficult contaminant to remove from wastewater due to its range of solubility and state of matter (speciation) over different chemical oxidation states mainly influenced by microbial biotransformation reactions (Chapters "Bacterial Metabolism of Selenium—for Survival or Profit" and "Understanding Selenium Biogeochemistry in Engineered Ecosystems: Transformation and Analytical Methods"). Chapter "Bacterial Metabolism of Selenium—for Survival or Profit" aims at presenting timely report of the state of the art regarding the microbial biotransformation of selenium chemical species. Chapter "Understanding Selenium Biogeochemistry in Engineered Ecosystems: Transformation and Analytical Methods" reports on the best analytical techniques allowing to monitor and unravel selenium biogeochemical pathways and determine selenium speciation in environmental technologies aiming at the removal of selenium from contaminated wastewaters.

Due to increased enforcement of selenium regulations and an increased understanding of its health and environmental effects, the need to be able to efficiently remove selenium from contaminated effluents has taken on an increased importance. Different treatment approaches may be applied for the removal of selenium from wastewater. This Springer book aims at reporting the recent advances

regarding different treatment technologies that could be implemented ranging from the biological approach (i.e., by using a pure bacterial strain—Chapter "Bioprocess Approaches for the Removal of Selenium from Industrial Waste and Wastewater by *Pseudomonas stutzeri* NT-I" or by using microbial consortia—Chapter "Industrial Selenium Pollution: Sources and Biological Treatment Technologies") to the physicochemical approach that is largely applied at industrial scale (Chapter "Industrial Selenium Pollution: Wastewaters and Physical-Chemical Treatment Technologies"). These three water treatment technology chapters aim at providing a suitable report of the state of the art regarding the (bio)processes designed for the removal of selenium from contaminated waste streams. These chapters will definitely bring necessary information when one needs to implement a water treatment process aiming at removing selenium from industrial contaminated effluents.

I would like to convey my appreciation to all contributors. My special thanks to Ms. Sofia Costa from Springer DE for her kind support and great efforts in bringing the book to completion. I would like to thank the series Editor of SpringerBriefs in Biometals Prof. Larry Barton for inviting me to wrap up all the recent knowledge regarding the (bio)remediation of selenium contaminated wastewaters. I am glad to submit this book, and I hope that the readers will appreciate reading this volume as much as I enjoy working on this topic for more than 10 years.

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