

Preface

Mineral and energy resources are increasingly being exploited to meet the demands of a worldwide growing population and economy. Despite technological developments, these raw materials cannot, or can only partly, be substituted by renewable resources within the next few decades. Thus, the efficient recovery and processing of mineral and energy resources, as well as recycling, are nowadays of significant importance in many countries.

Geobiotechnology can significantly contribute to new developments in this field and can be described as biotechnology in the geological context. This technology mainly takes advantage of the biological activity relevant for geochemical processes. Microorganisms control natural biogeochemical cycles and by doing so they contribute to the formation and alteration of metal, oil, coal, and phosphor deposits. Geobiotechnology comprises microbial processes in these deposits as well as in mining and environment. The interactions of microorganisms with raw materials enable an efficient geobiotechnological recovery of metals, oil and gas.

The ten chapters of this volume describe and summarize the scientific background and recent developments in metal bioleaching, bioextraction, biomineralization and bioremediation as well as in microbial enhanced oil and gas recovery (MEOR). Microbial processes in the underground and deposits, potentially used for the storage of raw materials or residues, or use of geothermal energy are also covered, including a chapter about basic mining legal principles.

The idea for this volume originated from the temporary working group Geobiotechnology of the German organisation DECHEMA e.V. Since many authors of this volume are active in this working group, geobiotechnological processes and applications are often described using examples from Germany and Europe.

The chapter on coal biotechnology is authored by the late Giovanni Rossi. He died in summer 2013 and could not live to see the publication. Giovanni Rossi was a dear friend, esteemed colleague, consummate engineer and researcher, and a pioneer in the field of biohydrometallurgy. We feel honored that he was able to finalize his contribution to this book. We dedicate this book in memory of Giovanni Rossi.

Axel Schippers
Franz Glombitza
Wolfgang Sand



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Schippers, A.; Glombitza, F.; Sand, W. (Eds.)

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