



*metals*



*Special Issue Reprint*

## **Advanced Technologies in Bio/Hydrometallurgy for Recovery and Recycling of Metals**

[www.mdpi.com/books/reprint/7883](http://www.mdpi.com/books/reprint/7883)

Edited by  
Stefano Ubaldini

ISBN 978-3-0365-8688-5 (Hardback)  
ISBN 978-3-0365-8689-2 (PDF)



The study of innovative and sustainable technologies for the recovery and reuse of raw materials (RMs) from primary and secondary resources is fundamental for economic and industrial development, in compliance with environmental protection and in the context of a circular economy. Bio/hydrometallurgy consists of leaching and recovery unit operations. Leaching is the solubilization of metals from a solid phase using chemicals or biological agents, whereas recovery is the extraction of metals from polymetallic leachate using physicochemical processes, electrowinning or biological processes. Bio/hydrometallurgical processes are new solutions and represent environmentally sustainable practices, not only in the mining and environmental sectors for the extraction of base, precious and toxic metals and rare earth elements (REE), but also for secondary resource valorization with a high content of critical raw materials (CRMs), which are fundamental in modern technological applications. The economics of the processes, which are closely linked to the choice and optimization of the experimental parameters, are of great importance. For publication in this Special Issue, we have considered those articles that contribute to the improvement of innovative bio- and/or hydrometallurgical processes applied for the recovery of valuable and critical metals.



Order Your Print Copy  
You can order print copies at  
[www.mdpi.com/books/reprint/7883](http://www.mdpi.com/books/reprint/7883)

MDPI Books offers quality open access book publishing to promote the exchange of ideas and knowledge in a globalized world. MDPI Books encompasses all the benefits of open access – high availability and visibility, as well as wide and rapid dissemination. With MDPI Books, you can complement the digital version of your work with a high quality printed counterpart.



### **Open Access**

Your scholarly work is accessible worldwide without any restrictions. All authors retain the copyright for their work distributed under the terms of the Creative Commons Attribution License.



### **Author Focus**

Authors and editors profit from MDPI's over two decades of experience in open access publishing, our customized personal support throughout the entire publication process, and competitive processing charges as well as unique contributor discounts on book purchases.



### **High Quality & Rapid Publication**

MDPI ensures a thorough review for all published items and provides a fast publication procedure. State-of-the-art research and time-sensitive topics are released with a minimum amount of delay.



### **High Visibility**

Due to our global network and well-known channel partners, we ensure maximum visibility and broad dissemination. Title information of books is sent to international indexing databases and archives, such as the Directory of Open Access Books (DOAB), and the Verzeichnis Lieferbarer Bücher (VLB).



### **Print on Demand and Multiple Formats**

MDPI Books are available for purchase and to read online at any time. Our print-on-demand service offers a sustainable, cost-effective and fast way to publish MDPI Books printed versions.