

# **Bioleaching** *of* **Nickel Ores**

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**UNIVERSITI MALAYSIA SABAH**

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**Dedicated to  
Shiridi Sai  
and  
my divine parents**

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## FOREWORD

In recent years, the application of bio-hydrometallurgy methods to the extraction of metals from minerals has definitely gained a prominent role supported by several bioleaching and biooxidation processes operating in different sites over the world. This may be an important reason why fundamental research has received a new powerful stimulus with fascinating discoveries. In addition, it surely will become the cause of future development in the field.

This book entitled *BIOLEACHING OF NICKEL ORES* authored by Prof. Dr. Pogaku Ravindra, a Professor of Chemical and Bioprocess Engineering of Universiti Malaysia Sabah (UMS), provides the state-of-knowledge on the relevance of bioleaching technology in metal extraction.

Two important aspects of bioleaching are covered in this book. One is the nature and diversity of the microorganisms that are central to the core function of bioprocessing of ores, and how these may be monitored in commercial operations. The biophysical strategies used by different microorganisms and microbial consortia for the biodegradation of the ubiquitous mineral pyrite, as well as what is known about the pathways and genetics of the enzymes involved in iron and sulphur oxidation are also described.

I am very glad to support the publication of this book by one of UMS's distinguish academician-cum-researcher who enjoys a long-standing reputation for disseminating scientific and technological knowledge, especially with respect to chemical and bioprocess engineering in developing countries over the last 30 years. In 2007, Prof. Dr. Pogaku Ravindra published, with UMS support, a book on *Teasers of Chemical Engineering*. This book has become quite popular among Chemical engineering students as well as teachers.

I hope that this new book could go some way towards introducing undergraduate and postgraduate students, interested academia and industrialists to the main subject of bioprocessing with special emphasis on the last contribution of the chemical and microbial aspects of bioleaching process and use of microorganisms in the treatment of complex ores and concentrates. I recommend this book to chemical and bioprocess students, tutors, lecturers, etc.

I am extremely happy to note that this book is probably the first Malaysian publication of its kind, particularly at a time when most of the Malaysian universities are offering biotechnology courses, both at undergraduate and postgraduate levels, in engineering and science streams.

I wish the authors, the best and this book, a success.

**Brig. Gen. Prof. Datuk Seri Panglima Dr. Kamaruzaman Hj. Ampon**  
Vice-Chancellor  
Universiti Malaysia Sabah  
Kota Kinabalu, Sabah  
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