Manganese Mineralization: Geochemistry and Mineralogy of Terrestrial and Marine Deposits

EDITED BY

KEITH NICHOLSON
The Robert Gordon University, Aberdeen, UK

JAMES R. HEIN
United States Geological Survey

BERNHARD BÜHN
Justus-Liebig Universität, Giessen, Germany

and

SOMNATH DASGUPTA
Jadavpur University, India

1997
Published by
The Geological Society
London
## Contents

### Introduction

**Nicholson, K., Hein, J. R., Bühn, B. & Dasgupta, S.** Precambrian to Modern manganese mineralization: changes in ore type and depositional environment 1

### Review

**Roy, S.** Genetic diversity of manganese deposition in the terrestrial geological record 5

### Precambrian deposits

**Glasby, G. P.** Fractionation of manganese from iron in Archaean and Proterozoic sedimentary ores 29

**Kulik, D. A. & Korzhnev, M. N.** Lithological and geochemical evidence of Fe and Mn pathways during deposition of lower Proterozoic Banded Iron Formation in the Krivoy Rog Basin (Ukraine) 43

**Bühn, B. & Stanistreet, I. G.** Insight into the enigma of Neoproterozoic manganese and iron formations from the perspective of supercontinental break-up and glaciation 81

**Manikyamba, C. & Naqvi, S. M.** Mineralogy and geochemistry of Archaean greenstone belt-hosted Mn formations and deposits of the Dharwar Craton: redox potential of proto-oceans 91

**Mukhopadhyay, J., Chaudhuri, A. K. & Chanda, S. K.** Deep-water manganese deposits in the middle to late Proterozoic Pallenga Group of the Pranhita–Godavari valley, South India 105

**Nicholson, K., Nayak, V. K. & Nanda, J. K.** Manganese ores of the Ghoriajhor–Monmunda area, Sundergarh District, Orissa, India: geochemical evidence for a mixed Mn source 117

### Cenozoic deposits


**Cronan, D. S.** Some controls on the geochemical variability of manganese nodules with particular reference to the tropical South Pacific 139

**Von Stackelberg, U.** Growth history of manganese nodules and crusts of the Peru Basin 153

**Usui, A. & Someya, M.** Distribution and composition of marine hydrogenetic and hydrothermal manganese deposits in the northwest Pacific 177

**Nath, B. N., Plüger, W. L. & Roelands, L.** Geochemical constraints on the hydrothermal origin of ferromanganese encrustations from the Rodriguez Triple Junction, Indian Ocean 199


**Rey, J., Somozas, L., Martinez-Frias, J., Benito, R. & Martin-Alfageme, S.** Deception Island (Antarctica): a new target for exploration of Fe–Mn mineralization? 239

**Crespo, A. & Lunar, R.** Terrestrial hot-spring Co-rich Mn mineralization in the Pliocene–Quaternary Calatrava Region (central Spain) 253

MIURA, H. & HARIYA, Y. Recent manganese oxide deposits in Hokkaido, Japan

**Geochemistry and mineralogy**

GRAMM-OSIPOV, L. M. Formation of solid phases of manganese in oxygenated aquatic environments

NICHOLSON, K. & ELEY, M. Geochemistry of manganese oxides: metal adsorption in freshwater and marine environments

DASGUPTA, S. P–T–X relationships during metamorphism of manganese-rich sediments: current status and future studies

NIMFOPOULOUS, M. K., MICHAILIDIS, K. & CHRISTOFIDES, G. Zincian rancieite from the Kato Nevrokiopi manganese deposits, Macedonia, northern Greece

GAMBLIN, S. D. & URCH, D. S. The determination of the valancy of manganese in mineralogical and environmental samples by X-ray emission spectroscopy

Index