

Processing of marine minerals: polymetallic nodules, crusts and massive sulphides

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Keywords: marine minerals, mineral processing operations, polymetallic nodules, cobalt-rich manganese crust, seafloor massive sulfides

Polymetallic manganese nodules (PMN), cobalt-rich manganese crusts (CRC) and seafloor massive sulfides (SMS) have been identified as important resources of economically valuable metals and critical raw materials. The currently proposed mineral processing operations are based on metallurgical approaches applied for land resources. Thus far, significant endeavors have been carried out to describe the extraction of metals from PMN; however, to the best of the authors' knowledge, it lacks a thorough review on recent developments in processing of CRC and SMS. This paper begins with an overview of each marine mineral. It is followed by a systematic review of common methods used for extraction of metals from marine mineral deposits. In this review, we update the information published so far in peer-reviewed and technical literature, and briefly provide the future perspectives for processing of marine mineral deposits.