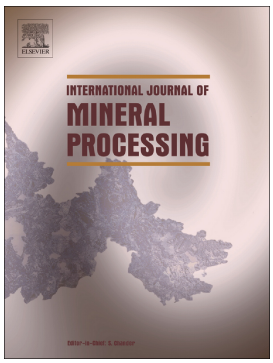

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PII: S0301-7516(17)30236-3
DOI: doi:10.1016/j.minpro.2017.11.002
Reference: MINPRO 3118

To appear in: *International Journal of Mineral Processing*

Received date: 7 December 2016
Revised date: 3 November 2017
Accepted date: 6 November 2017

Please cite this article as: Baozhong Ma, Weijiao Yang, Peng Xing, Chengyan Wang, Yongqiang Chen, Dongya Lv , Pilot-scale plant study on solid-state metalized reduction–magnetic separation for magnesium-rich nickel oxide ores. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Minpro(2017), doi:10.1016/j.minpro.2017.11.002

Pilot-scale plant study on solid-state metalized reduction–magnetic separation for magnesium-rich nickel oxide ores

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Abstract: An innovative technology named solid-state metalized reduction–magnetic separation (SSMRMS) was developed to produce ferronickel concentrates from magnesium-rich nickel oxide ores. A pilot-scale plant with a daily processing capacity of 500 kg of dry ores was assembled and tested. SSMRMS involves four steps: feed preparation, solid-state metalized reduction, quenching and ball milling, and magnetic separation. After 40 days of continuous tests, the operational stability of the proposed technology was good, and accretion did not form in a rotary kiln. Results revealed that (i) an appropriate positive pressure in the kiln terminal was beneficial to metallization; (ii) the overall recoveries of nickel and iron could reach 91.3% and 73.8%, respectively, whereas the nickel and iron grades of the produced ferronickel concentrate could be 7.4% and 69.6%, respectively; (iii) residual nickel to tailings was 0.16%; and (iv) the return ratio of dusts was approximately 8%. Notably, nickel could be released and sufficiently metalized at an appropriate temperature once the structures of the Ni-bearing silicates were destroyed in the presence of fluorite. The metalized nickel aggregated with the metalized

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