Document details

International Journal of Minerals, Metallurgy and Materials
Volume 21, Issue 4, April 2014, Pages 326-330

Effect of reduction roasting by using bio-char derived from empty fruit bunch on the magnetic properties of Malaysian iron ore (Article)

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Abstract

View references (15)

Beneficiation of Malaysian iron ore is becoming necessary as iron resources are depleting. However, the upgrading process is challenging because of the weak magnetic properties of Malaysian iron ore. In this study, bio-char derived from oil palm empty fruit bunch (EFB) was utilized as an energy source for reduction roasting. Mixtures of Malaysian iron ore and the bio-char were pressed into briquettes and subjected to reduction roasting processes at 873-1173 K. The extent of reduction was estimated on the basis of mass loss, and the magnetization of samples was measured using a vibrating sample magnetometer (VSM). When reduced at 873 K, the original goethite-rich ore was converted into hematite. An increase in temperature to 1073 K caused a significant conversion of hematite into magnetite and enhanced the magnetic susceptibility and saturation magnetization of samples. The magnetic properties diminished at 1173 K as the iron ore was partially reduced to wustite. This reduction roasting by using the bio-char can assist in upgrading the iron ore by improving its magnetic properties. © 2014 University of Science and Technology Beijing and Springer-Verlag Berlin Heidelberg.

Author keywords

bio-char | iron ores | magnetic properties | ore reduction | ore roasting

Indexed keywords

Engineering controlled terms: Calcination | Fruits | Hematite | Iron ores | Magnetic properties | Magnetic susceptibility | Ore reduction | Ore roasting | Palm oil

Bio chars
Empty fruit bunches
Energy source
Malaysians
Mass loss
Oil palm empty fruit bunches (EFB)
Reduction roasting
Vibrating sample magnetometer

Engineering main heading: Iron ore reduction

ISSN: 16744799
Source Type: Journal
Original language: English
DOI: 10.1007/s12613-014-0912-y
Document Type: Article
Publisher: University of Science and Technology Beijing