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## **Experimental investigation on recovery of Fe–Ni alloy from Bayer red mud and laterite nickel**

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### **ABSTRACT**

In this paper, a process of extracting Fe–Ni alloy from red mud and laterite nickel has been proposed. Red mud, laterite nickel, and coke powder were heated together inside an electric arc furnace so as to obtain Fe–Ni alloy. The experiments indicated that recovery rates of Fe–Ni alloy were from 70 to 89%, when the coke content increases from 20 to 35%. The microstructure of the alloys depends mainly upon the coke content. The metallographic structure features white iron when addition of coke was below 25%. The free graphite flakes appeared when the coke content was 25%, where the microstructure can be featured cementite and stripe-shaped graphite. If the coke content gets to 30% or more, the microstructure is characterised by grey iron. It is manifested that impact work increases and hardness decreases of the alloys with the increasing of coke content, accordingly the microstructures change from white iron to grey cast iron. In conclusion, this process is a potential technology for reduction of Fe alloys from red mud and for manufacture of Fe–Ni alloys from red mud and laterite nickel.

**KEYWORDS:** red mud, laterite nickel, carbothermic reduction