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Hydro-, pyrometallurgical method of obtaining alloys system Fe-Ni-Cr-Mn-Si

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Abstract

The paper presents an analytical review of methods for processing oxidized nickel ores (ONO). It is shown that in modern conditions, domestic deposits of the ONO are not exploited at full capacity and by a technologically obsolete and environmentally dangerous scheme of processing of ONO by reduction-sulphiding mine melting for matte. In our country, electrolytic nickel containing about 99% Ni is mainly used for the smelting of high-quality nickel steels, the high price of which does not contribute to the development of production of nickel-containing steels. The decision of the problem of profitability of processing of domestic poor oxidized nickel ores is the creation of a new promising technology for their processing. As an alternative to the existing restorative-sulphiding mine smelting on matte in Russia, it is possible to consider a hydro-, pyrometallurgical method for obtaining alloys of the Fe-Ni-Cr-Mn-Si system.

Experimental method showed that by hydrolytic precipitation (sodium hydroxide) at pH = 6.5, Al_2O_3 is completely recovered in the precipitate, which after calcination at 700 °C forms a powder of commercially pure alumina. When the remaining solution is treated with sodium hydroxide at pH 9.5, more than 99% of nickel and cobalt oxides, 92% of MnO and 46% of MgO are precipitated. As a result of selective deposition of oxidized nickel ore elements with sodium hydroxide, an oxide concentrate was obtained, which after roasting at 700 ° C contained, by mass. %: 67 NiO; 3 CoO; 20 MnO; 9 MgO.

For the processing of nickel-containing concentrate, a pyrometallurgical method for melting complex ferroalloys of the Fe-Ni-Cr-Mn-Si system is proposed, using ferrous selenium chromium as the reducing agent. A scheme of a hydro-, pyrometallurgical method for the processing of oxidized nickel ores has been developed, including: crushing, heap leaching, hydrolytic precipitation to produce aluminum and nickel-cobalt concentrates, silicothermic smelting to obtain complex alloys containing. %: 59% Ni; 17% Cr; 12 Fe; 6.5 Mn; 2.7 Si; 2.6 Co, suitable for melting stainless steels.

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