RECOVERABILITY EVALUATION BASED ON CHEMICAL STATE ANALYSIS OF NICKEL AND ASSOCIATED ELEMENTS WITH A FOCUS ON FERRONICKEL PRODUCTION PROCESS

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1. Introduction

Global production of nickel grows drastically since 1950, and the demands are predicted to increase continually. Nickel migrates among countries and regions from mining to products, since its uneven distribution. Meanwhile, the dissipation of nickel result from mining and metallurgy process with is approximately 18%[1)] . Japan needs to ensure a stable supply of raw material since its supply depends on overseas. Therefore, there is seeking for increasing the yield ratio during refining process, as well as including the use of secondary resources.

2. Methods and results

In this study, we analysis the information of nickel collected by research, while the migration amount of elements in process was calculated by Substance Flow Analysis. Also, the characteristics and recoverability of samples from nickel-related process were studied by experiment. Primary experiment methods in this study were sequential extraction and X-ray absorption fine structure (XAFS).

By Substance Flow Analysis of ferronickel processes, nickel element distributes both in main product ferronickel and by-product such as slag and dust. It has been identified by experiment that nickel concentration in dust generated from ferronickel process is close to that in ores, which shows a potential of dust to be reused as a raw material.

3. Conclusion

By the research and experiment above-mentioned, we integrate the results of the flow and the chemical form, and create a "chemical state flow". Fig.1-1 shows the chemical state changes of nickel in flow of ferronickel production process.

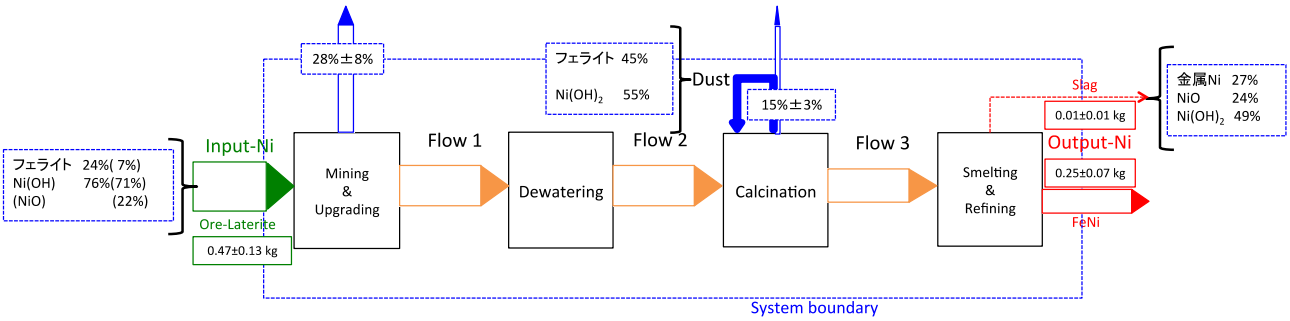

Fig.1-1 Result of Substance Flow Analysis with chemical states of Ni

Citation

1） Reck, B. K., Graedel, T. E., Challenges in Metal Recycling. *Science* 337, 2012, pp.690-695.