# MATTE SMELTING AND PURIFICATION PROCESS FOR RECYCLING OF EOL-LIB

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## ABSTRACT

Recently, as the production of electric vehicles has rapidly increased, the production of lithium-ion batteries containing high-purity valuable metals (Ni and Co) is required. According to the amount of End-of-life lithium-ion batteries (EoL-LiB) has rapidly increased, there is a need to improve environmental issues. However, there are limits to process changes for removing impurities and achieving high purity of diversified recycled resources in hydrometallurgical process for recycling of EoL-LiB. Therefore, a transition to hybrid process capable of mass production is required, and the research was conducted on matte smelting and purification process using recycled resources.

Ni and Co contained in various resources were recovered using molten iron in high-temperature smelting process. The recovery behaviour depending on the type of resource by carbon content was compared with the thermodynamic calculations using FactSage 8.2$^{TM}$. The alloy containing Ni and Co was concentrated through addition of sulphur and oxygen blowing and smelted into matte with improved concentration of Ni and Co. An aqueous solution containing Ni and Co was obtained through a pressure oxidation leaching (POX), and it was confirmed that the Ni and Co recovery rates were closely related to the ORP and pH of the pregnant leaching solution (PLS). The leachate was highly purified into Ni and Co compound through a neutralization process, and the impurity concentration in the Ni and Co compound was maintained below 0.5%. In order to develop the matte smelting and purification process utilizing recycled resources, process condition was established by engineering software (METSIM).

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