Cobalt and nickel separation

Cobalt and nickel separation

The selective separation of cobalt from nickel is of major importance for the recovery of cobalt from primary or secondary sources, as well as for analytical purposes. In this paper, the extraction of cobalt from the mixtures was examined using a supported liquid membrane employing the undiluted hydrophobic ionic liquid, namely tri (hexyl ...

Our findings suggest that metal selectivity depends on electrode potential and polymer loading (Fig. 1), thus leading to a surface-tunable method for direct separation of cobalt and nickel in...

A new process has been developed jointly by CSIRO and CESL, for separating cobalt from nickel in an impure leach solution. The process uses synergistic solvent extraction (SSX) with commercially available reagents, but in a novel and efficient manner using kinetic factors.

Novel cobalt/nickel separation process using aqueous two-phase systems (ATPSs) was proposed. Phase diagrams of ATPSs formed by polymer polyethylene glycol 20,000 and several sodium electrolytes were provided. Metal ion extraction was studied in ATPSs coupled with the organic extractant 1-nitroso-2-naphthol (1N2N).

This review provides a detail on solvent extraction processes developed for the separation and recovery of cobalt and nickel from secondary resources in the last decade. The study illustrates applicability of different type of extractants to provide better separation and recovery of said metals from potential wastes originated from different ...

Thank you for visiting nature . You are using a browser version with limited support for CSS. To obtain the best experience, we recommend you use a more up to date browser (or turn off compatibility mode in Internet Explorer). In the meantime, to ensure continued support, we are displaying the site without styles and JavaScript.

In concentrated chloride, controlling applied potential and/or polyelectrolyte loading (PDADMA, poly(diallyldimethylammonium chloride)) allows to tune molecular selectivity of cobalt and nickel in electrodeposition processes.

Linear sweep voltammograms of a single metal salt of 10 mM Co(II) or Ni(II) in a 0.1 M Li2SO4, b 0.1 M LiCl, and c 10 M LiCl at a scan rate of 5 mV s-1. Surface Co/Ni ratios on the electrodeposit formed in the binary mixture of 10 mM Co(II)+Ni(II) in the background electrolyte of d 0.1 M Li2SO4, e 0.1 M LiCl, and f 10 M LiCl.

To obtain insights into the electrochemical reaction during the electrodeposition, electrochemical quartz

crystal microbalance (EQCM) measurements and analyses were carried out. By combining the change in mass with Faraday"s law, the specific mass change per the number of electrons could be determined--namely m/z (g mol-1)--which is a useful parameter for studying faradaic processes and quantifying their associated efficiencies49. For example, the direct cobalt reduction takes place according to this reaction50:

where the corresponding theoretical m/z value is 29.5 g mol-1 (atomic weight of cobalt/2e- = 58.9 g mol-1/2e-). If hydrogen evolution takes place simultaneously, cobalt electrodeposition can also occur through the formation of cobalt hydroxide50:

where the corresponding theoretical m/z value is 46.5 g mol-1 (molecular weight (MW) of cobalt hydroxide/2e- = 92.9 g mol-1/2e-). In the same way, the theoretical m/z value for direct nickel reduction (29.3 g mol-1) and nickel hydroxide formation (46.4 g mol-1) could be determined.

The effect of a background electrolyte and interfacial polymer on a surface Ni/Co ratio at nickel-favored potential of -0.6 V vs Ag/AgCl and b surface Co/Ni ratio at cobalt-favored potential of -0.725 V vs Ag/AgCl. c A XRF spectrum and d-f EDS mapping of cobalt and nickel on the electrodeposit formed using PDADMA/Cu (PDADMA loading: 0.07 mg cm-2) at -0.725 V vs Ag/AgCl in 100 mM Co(II) and Ni(II) in 10 M LiCl. Scale bars for EDS and cobalt/nickel mapping are 500 nm. Error bars indicate standard error of the mean (n = 3).