Early-Stage Lithium Recovery (ESLR) for Enhancing Efficiency in Battery Recycling

Poster - January 2020
DOI: 10.13140/RG.2.2.24566.55364

CITATIONS 0
READS 136

6 authors, including:

Paul Sabarny
RWTH Aachen University
3 PUBLICATIONS 0 CITATIONS

Lilian Peters
RWTH Aachen University
15 PUBLICATIONS 2 CITATIONS

Marcus Sommerfeld
RWTH Aachen University
4 PUBLICATIONS 3 CITATIONS

Christin Stallmeister
RWTH Aachen University
7 PUBLICATIONS 0 CITATIONS

Some of the authors of this publication are also working on these related projects:

Low-emission synthesis of titanium alloys View project

Bilateral Project Serbia-Germany: Novel designs of synthesis for tailoring the ordered structures of multicomponent metal oxides as uniform coatings of activated titanium anodes View project
Early-Stage Lithium Recovery (ESLR) for Enhancing Efficiency in Battery Recycling

Paul Sabarny[1], Lilian Schwich[1], Marcus Sommerfeld[1], Christin Stallmeister[1], Claudia Vonderstein[1], Bernd Friedrich[1],
[1] IME Process Metallurgy and Metal Recycling - RWTH Aachen University

Motivation
- Robust and flexible battery recycling processes
- Still unsolved challenges in Li-recovery e.g. Li-losses in slags and cross-contaminations in different pyro- and hydrometallurgical extraction paths
- Indispensability for battery technology and rising prices make lithium recovery important
- Maintaining of flexibility for hydro-, and pyrometallurgical processing

Research Targets
1. Low energy requirement
2. No chemicals needed
3. No Co/Ni losses
4. Easy and safe process
   (simple plant construction, minimized offgas treatment)
5. Lithium Recovery \( \eta_{Li} > 90\% \)
6. H\(_2\)O circulation / near zero waste

Smelting Example

<table>
<thead>
<tr>
<th>Lithium Distribution</th>
<th>Lithium in slag</th>
<th>Lithium in Alloy</th>
<th>Lithium in Flue Dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balanced to 100%</td>
<td>74,3 %</td>
<td>0,3 %</td>
<td>25,4 %</td>
</tr>
</tbody>
</table>

Unavoidable occurrence of Lithium in slag and flue dust, due to ignoble and volatile behavior

Leaching Example

<table>
<thead>
<tr>
<th>Lithium Distribution</th>
<th>Lithium in Other Filter Cakes</th>
<th>Lithium in Li Filter Cake</th>
<th>Lithium in Residual Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>27,0 %</td>
<td>60,0 %</td>
<td>13,0 %</td>
<td></td>
</tr>
</tbody>
</table>

Unacceptable Lithium losses in different filter cakes due to physical adsorption

Solution:
Li-Phase transformation into water soluble compounds by methods such as:
- Supercritical CO\(_2\)-treatment
- Thermal carbonation

→ Early-Stage Li-Recovery

For more information please follow this QR code. In case of questions please contact psabarny@ime-aachen.de