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

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 [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

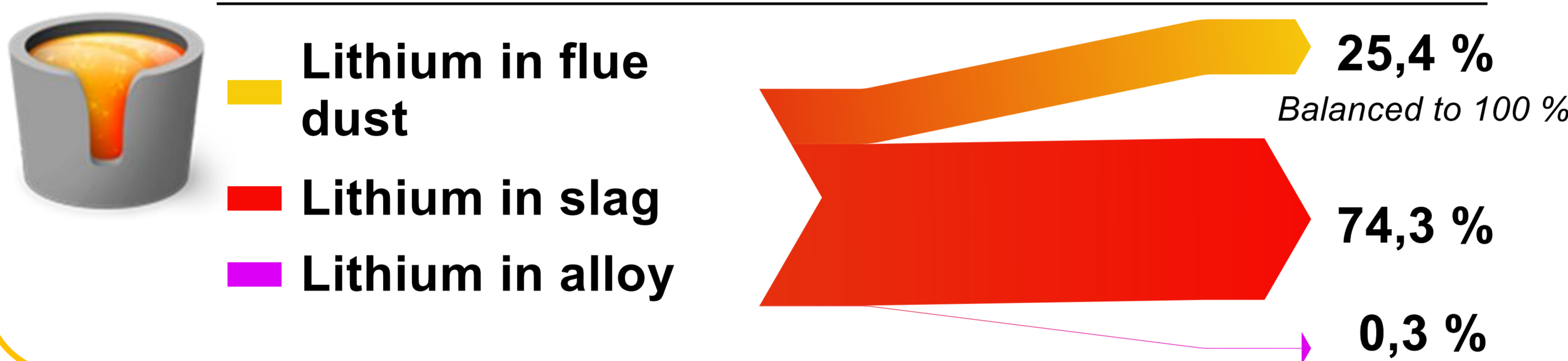
Research Targets

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. H₂O circulation / near zero waste



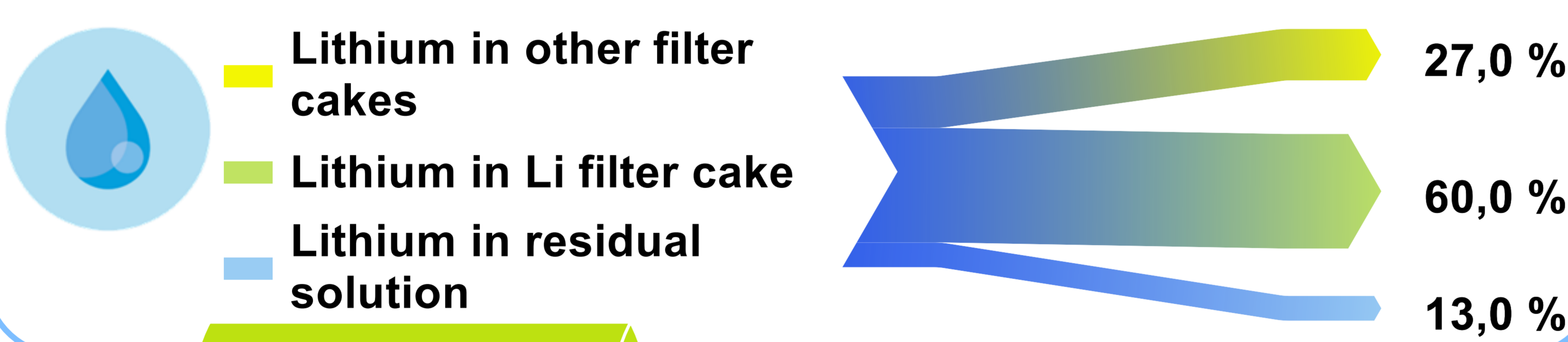
Lithium Distribution in Conventional Extraction Paths

Smeltig Example



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

Leaching Example



Unacceptable Lithium losses in different filter cakes due to physical adsorption

Spent Battery

GREEN[®]
M E T A L L U R G Y

Dismantling (to cell level)

With thermal pre-treatment (pyrolysis)

Without thermal pre-treatment

Shredding & Separation

Al, Cu, Fe

Li-phase transformation

Solid-liquid separation

Graphite, Ni, Co

H₂O/Li

Solution:

Li-Phase transformation into **water soluble** compounds by methods such as:

- Supercritical CO₂-treatment
- Thermal carbonation

→ **Early-Stage Li-Recovery**

ESLR

For more information please follow this QR code. In case of questions please contact

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