Advertisement for HiWi position & Master Thesis project


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Is sustainability important for you?

What about developing recycling strategies for all-solid-state lithium-ion batteries with us?

All-solid-state lithium-ion batteries (ASSLIBs) with solid electrolytes (SEs) are promising candidates for high energy density applications e.g. electric vehicles, along with their higher safety compared to organic liquid electrolytes. Several inorganic SE classes (e.g. oxides, sulfides and halides) have been extensively studied over the years [2]. These studies mainly focus on the fabrication and operation of ASSLIBs, however an important aspect currently largely neglected by the scientific community is the recycling of several valuable elements (e.g. lithium, rare earth elements, cobalt, etc.) which are contained in such ASSLIBs [3]. Currently, we are developing individual recycling strategies for 3 different SE classes (e.g. oxides ($Li_7La_3Zr_2O_{12}$ & $Li_{3x}La_{2/3-x}TiO_3$), sulfides (*ß*-Li_3PS_4 & Li_6PS_5Cl) and halides (Li_3InCl_6)) in combination with common electrode materials (e.g. $Li_4Ti_5O_{12}$, $LiFePO_4$, $LiNi_{0.1}Mn_{0.8}Co_{0.8}O_2$, $LiCoO_2$, etc.). Hydrometallurgy for the oxide- based SEs and direct recycling for the sulfide- and halide- based SEs have proven to be successful recycling approaches for a re-synthesis of all battery materials. However, these recycling approaches need to be further optimized. Especially, the structural investigation of the recovered materials via XRD, SEM, EDX, ICP-MS needs to be performed, in order to understand their influence on the electrochemical behavior via EIS measurements [4].

We are currently looking for a master student of Materials Science or Chemistry for an HiWi position which is seeking to do his/her Master Thesis in the same topic with us at a later state.

If you are interested or require further information, please contact:

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References:

[1] https://www.nursshop.com/2017/04/11/signs-bad-cellphone-battery/

[2] A. Masias, ACS Energy Letters, 2021, 6, 621-630.

[3] A. Luqman, Matter, 2020, 3, 1845-1861.

[4] A. Nowroozi, ChemistryOpen, 2022,11.3, e202100274.