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Supporting Information

Recycling of All-Solid-State Li-ion Batteries: A Case Study of the Separation of Individual Components Within a System Composed of LTO, LLZTO and NMC

Aamir Iqbal Waidha,* Amila Salihovic, Martine Jacob, Vanita Vanita, Burak Aktekin, Kristina Brix, Kerstin Wissel, Ralf Kautenburger, Jürgen Janek, Wolfgang Ensinger, and Oliver Clemens*This publication is part of a joint Special Collection on Solid State Batteries, featuring contributions published in Advanced Energy Materials, Energy Technology, Batteries & Supercaps, ChemSusChem, and Advanced Energy and Sustainability Research.

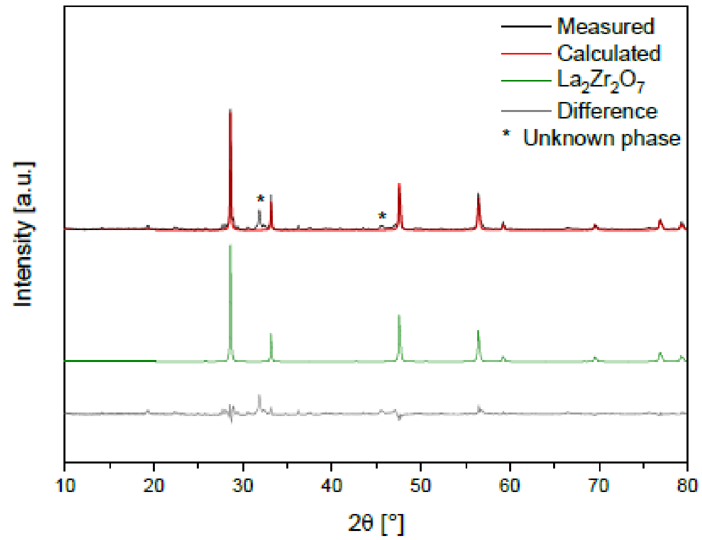

Figure S 1. XRD pattern and Rietveld refinement of the resynthesis of $La_{2+x}Zr_{2-x}O_{7-x/2}$:Ta after first calcination at 900 °C for 12 h and sintering at 1100 °C for 10 h.

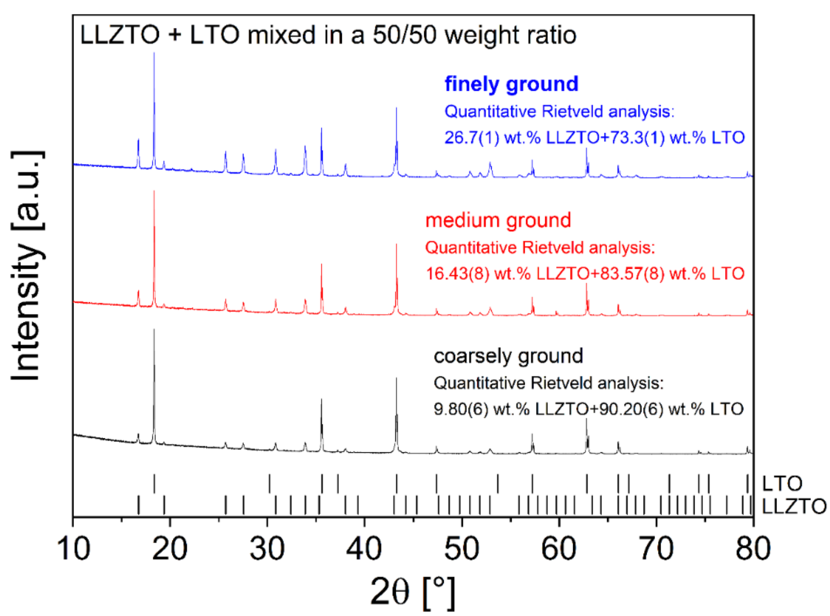

Figure S 2. Influence on grinding a 50 : 50 wt-% mixture of LTO and LLZTO. Repeated grinding results in an increase of the intensity of the LLZTO reflections, which indicates that too coarse primary particle sizes and the large difference of absorption coefficient for the two materials are the origin for the inaccurate quantification based on Rietveld method.

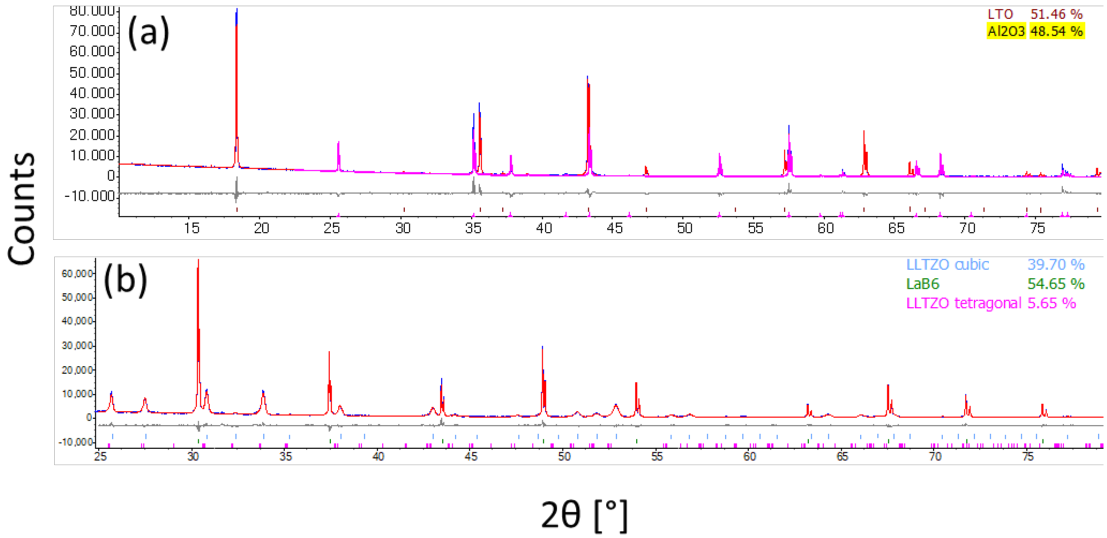

Figure S 3. Quantification of well ground mixtures of 50 : 50 wt-% mixtures of materials with similar absorption coefficients for X-rays. (a) LTO and Al_2O_3. (b) LLZTO and LaB_6.

Information on the quantification of mixtures of materials with different absorption behavior by Rietveld analysis

The Rietveld method is a common standard to quantify phase mixtures of crystalline materials. However, this can become problematic for materials with different absorption coefficients (e. g. low absorbing LTO and highly absorbing LLZTO), where the strong absorber is in addition coarser than the low absorber (LLZTO is sintered at higher temperatures than LTO). This results normally in a strong overquantification of the low absorber (see Figure S2), though the materials themselves can be well quantified with other standard materials with similar absorption coefficients (see Figure S3). This indicates that for the analyses of phase mixtures of LLZTO with other materials diffraction analysis must be complemented by elemental quantification approaches.