

Solid state sUlfide Based LI-MEtal batteries for EV applications

Deliverable 7.3 Report on the prediction of electrochemical performance and degradation behaviour

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Publishable summary

The main focus of the SUBLIME project is to study and formulate new cell technologies with solid-state electrolyte. Within this project the overall objective of WP7 is to drive the iterative development of SUBLIME material and sulfide solid state battery cell technology through multiscale physics-based modelling approach. In particular, this deliverable reports on the development of a model to estimate the full performances and to understand and predict the degradation at full cell level. To achieve these objectives, first a continuum model was developed that can predict coin cell performances based on developed materials properties. Following that, a P4D model was developed using the geometric dimensions of the tested coin cell. The electrochemical parameters obtained for continuum model are further used in the P4D model to predict beginning of life (BoL) performance. The P4D modelling approach allows to observe the non-homogeneities taking place within the cell and thus provides an informative framework for investigating cell degradation and ageing. This would be of benefit especially in the case of cells with larger dimensions where more non-uniformities occur.

Accordingly, in the final stage, the ageing effect was further implemented in the P4D model to account for cell degradation and consequent capacity loss. The ageing model is parameterized to reproduce the observed coin cell cycling ageing test.