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Ph.D. thesis (2023-2026)
LGP2 (R. Passas; C. Martin)

Influence of the drying conditions on the surface properties of end-products during Roll to Roll surface functionalisation : comparison between copper and fiber-based strips

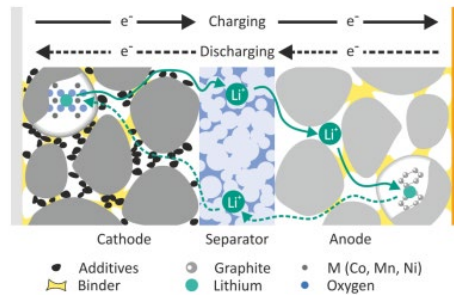
Influence des conditions de séchage sur les propriétés de surface des produits finis lors de la fonctionnalisation de surface Roll to Roll : comparaison entre les bandes à base de cuivre et de fibres

Context

Energetic transition

- Need to store the energy produced
- Increase in electric car production
- Need to improve the manufacturing process

Lithium-ion battery



Schematic drawing of the components and operation of a lithium-ion battery cell – Marcel Schmitt – slot die coating of lithium ion battery electrode

The electrodes are manufactured by coating an active material on the current collector

- Copper film for anode
- Aluminum film for cathode

Funded by:

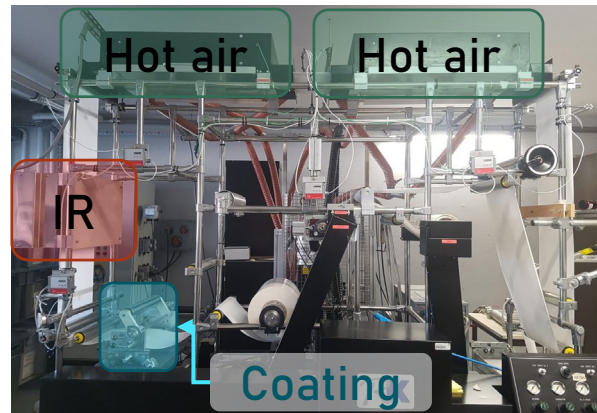
AMI – CMA, L'école de la batterie, Grenoble-INP UGA



Objectives

Adaptation of a paper functionalization driver for the functionalization of a battery anode

Anode manufacturing

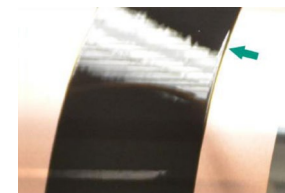


Functionalization driver

Study of anode drying

Optimisation of anode drying

- IR drying
- Hot air drying
- Surface defect detection



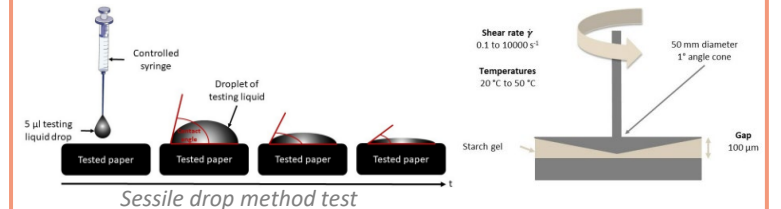
Battery anode - Marcel Schmitt – Slot die coating of lithium-ion battery electrodes

Methods

Comparison between copper and fiber-based strips

Ink characterisation

- Rheological characterisation
- Adhesion to the substrate

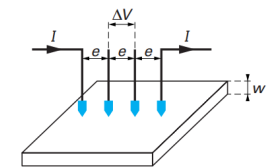


Sessile drop method test

Rotational rheological measurement with a cone-plan system

Copper film characterisation with and without functionalisation

- Electrical characterisation
- Electrochemical characterisation
- Surface characterisation
- Thermal characterisation
- Mechanical characterisation



Conductivity measurement with the four-probe system

Analogy humidity for paper and thermal dilatation for copper strip

