NEWSLETTER # 4

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High powered thin film batteries for electronics printed on paper in R2R processes

Introduction

The sustainable paper-based products developed in the A3PLE project are dedicated to interact with their users and/or report changes in their environment; Such smart objects need embedded energy in form of a thin film battery. Consequently, the battery design and its manufacturing process have to be compatible with the envisioned techniques of integration on the paper substrate. CEA, VARTA and LabelTech have gathered their complementary competences in order to propose innovative solutions.

Objectives

- Design a safe thin film battery exhibiting low self-discharge to power the sensors and the display embedded on A3PLE paper substrate.
- Evaluate the performances of the battery through the electrical tests performed on the A3PLE demonstrators
- To develop a method for manufacturing a roll of batteries allowing their hybridization onto the application in R2R process
- To validate the transfer of the batteries during an hybridization test performed at LabelTech

Manufacturing process

Combination of coating, printing techniques, and co-lamination. The electrodes and the electrolytic separator are realized by screen printing.

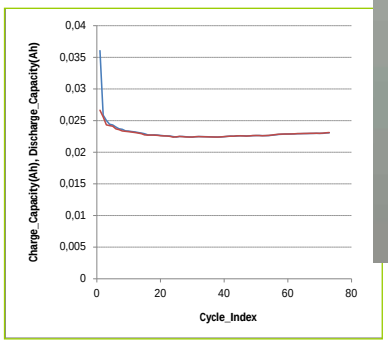
Patterned positive electrode

Patterned negative electrode with printed separator

Specifications of the A3PLE battery

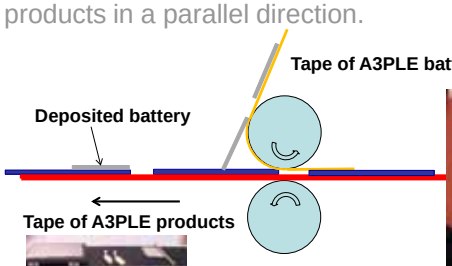
The battery is based on the Li-ion technology, and designed to be safe and offer long life time;

- Outline dimensions: 63 (±1) x 52 (±1) in mm
- Thickness: ~ 400 µm
- 3.2V, 24mAh

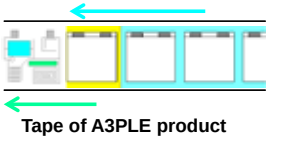


Hybridization of the battery: principle

One (or several) battery, (depending on the energy need) will be transferred from a tape onto the A3PLE products in a parallel direction.



Preparation of the tape of batteries



Results and work in progress:

Various versions of thin film batteries have been realised at the lab scale in order to assess the most appropriate method for an industrial manufacturing in continuous mode. The elaboration of the battery core by screen printing is now well managed. Investigations are now focused on the inert parts of the battery (current collectors and packaging) with the aim to demonstrate their ability to be hybridized.

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