

M-ERA-Net

Plasma-coated materials for « green » batteries

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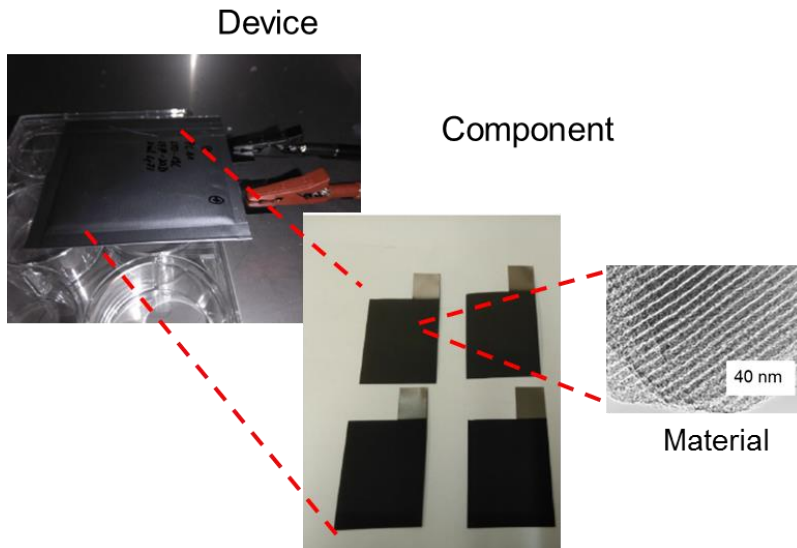
Partners



ULiège – NCE

- Battery assembly from components
- Water-based processes
- Impact of assembly on performances

Batteries by water-based spray



UNamur – LARN / ICS

- Specialized in plasma coatings
- Fundamental research → applications
- Valorization by ICS (spin-off)

Surfaces and powders coated with C

(among others)



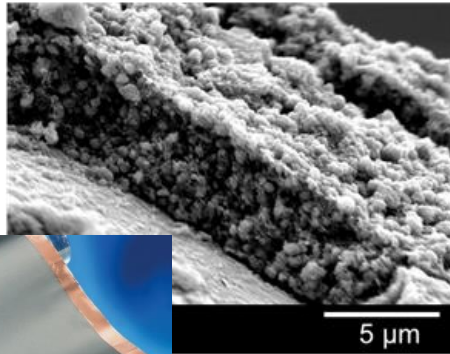
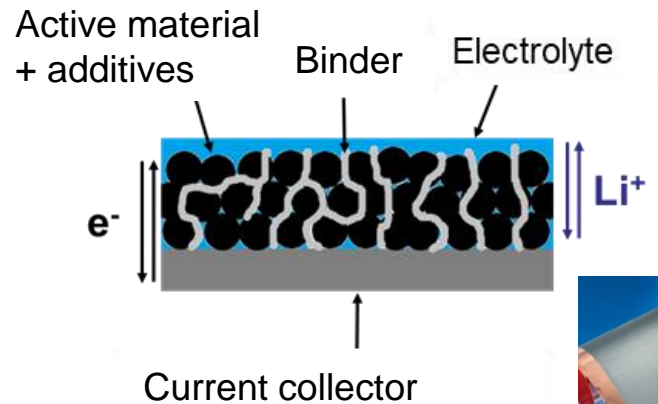
Figure 1: deposition on Steel 3D parts

ZrO₂ in water



Problem and idea

Li-ion / Na-ion batteries – electrode design



Electrode = composite material coated on a metal sheet (Cu or Al)

Presence of binder (PVDF) and conductive additives

Toxic solvents

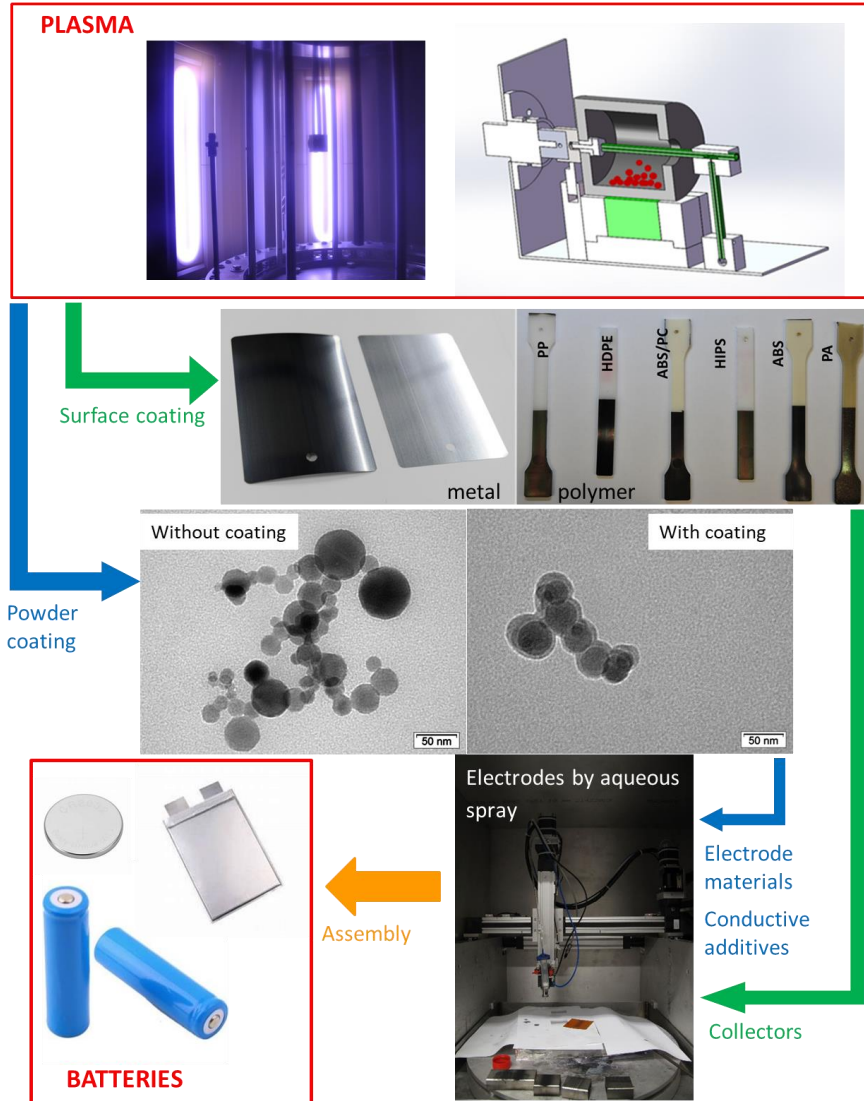
Replacement of metallic current collectors by carbon (PVD coating)

- No critical material
- Coating on any support (flexible, low cost)

Carbon coating on conductive additives and active materials

- Materials compatibles with aqueous processing
- Better dispersion (and performances, e.g. charge-discharge speed)

Strategy



Current collectors:

- C coating on polymer
- C coating on cheap steel
- Others?

Powders:

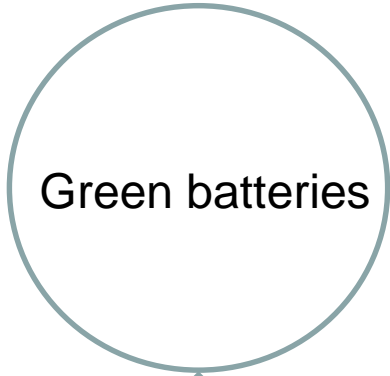
- Active materials sensitive to water (NMCs, NCAs, Si, ...)
- Active materials that do not disperse easily in water
- Active materials that need protective layer for charging/discharging (graphite, Si, ...)
- Conductive additives (dispersability) (C black, CNTs, fibers...)
- Others?

Partnership



- Electrode/battery manufacturing by aqueous process
- Battery characterization
- Lab scale

- Powder and surface coating
- Physico-chemical characterization
- Upscaling of coating process



- Battery materials experts/providers
- Battery manufacturer for larger scale validation



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Sought partners