
smart
advanced manufacturing
cramik

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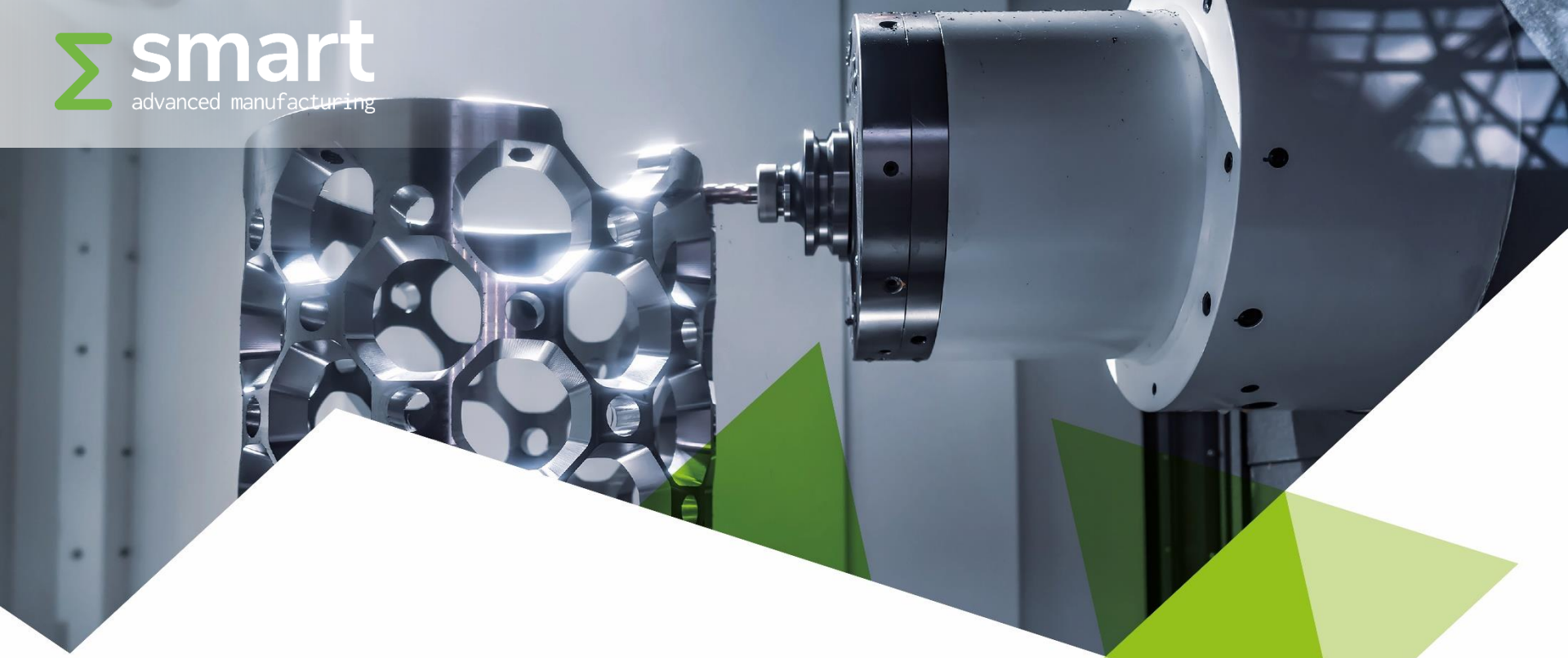

PROJECT BoDAM

(Battery on Demand for Additive Manufacturing)

CRAMIK

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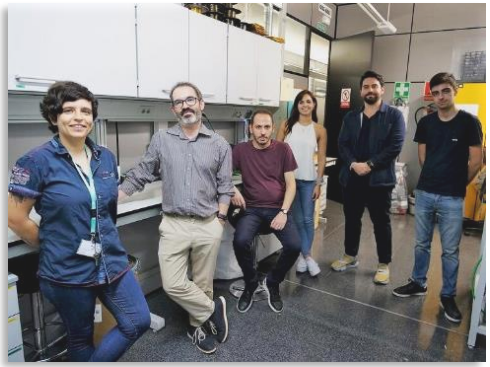
CRAMIK *(Former Laboratorio Print3d Solutions CLM, S.L.) is a* ***MATERIAL TECH START-UP specialized in Engineering Ceramics.***

- *7 employees – 550 m² Facility with Lab & Pilot plant capabilities up to 30 Kg/day.*
- *Material Development + Proof of Concept + Commercialization (Pre-Sales).*
- *Expertise in Ceramic charging & polymer combination for new material developments.*
- *PRODUCTS: 9 materials portfolio (so far), developed using high end ceramics for* ***THERMAL / BIO / CLAY / ELECTRO end industries.***

Key differentiator relies on a patented formulation that allows to freely combine multiple ceramics blended together with an unique polymer binder. (Granted in CHINA / USA/ EU / SPAIN / SOUTH KOREA / JAPAN)

We offer a young and commited team with combined expertise of +25 years in additive manufacturing polymer-based technologies, chemistry and application development.



BoDAM *(Battery on Demand for Additive Manufacturing)*

Battery on Demand for Additive Manufacturing

Vision

*Demonstrating the feasability of **3D printing processing for full Ceramic-based Solid State Batteries (SSB)** to ensure energy storage capabilities on remote locations, on demand in a reliable and repeatable process.*

Motivation

Due to the surging importance of energy management and worldwide soil resources optimization, we aim to enable potential needing industries of a way to ensure potential energy storage improving the design freedom and ergonomics development like never before.

We also need better batteries with high thermal resistance to avoid temperature issues and unexpected fires due to the use on unstable liquid electrolytes. Also, in the actual context, it is mandatory to use cobalt-free materials and find better alternatives.

We aim to produce a new generation of ceramic SSB's combining multi geometry freedom from 3D printing and the versatility of CRAMIK´s formulation

Expected Deliverables

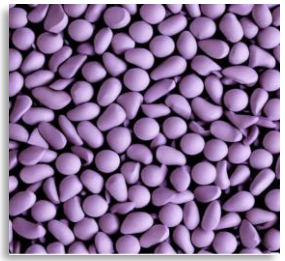
Our focus is the formulation and production of 3D Printable ceramic electrodes and electrolytes to assembly a full SSB Li-ion battery with improved electrochemical performance and high thermal resistance.

Due to the versatility of our formulation, ***we offer different technological possibilities*** *using several product formats:*

Slurry

LDM – Liquid Deposition Modelling

Pellet



Pellet Printing – Big format

Filament

FDM – Fused Deposition Modelling

The expected deliverables include, as a temptative list:

- **Ceramic anode based on graphite and/or LTO**
- **Ceramic cathode based on LFPO and/or NMC**
- **Ceramic electrolyte based on LLZO and/or LATP**
- **Fully assembled SSB of a given geometry (Proof of Concept)**

BoDAM *(Battery on Demand for Additive Manufacturing)*

Our background

*During 2019-2022, **in the frame of a NEOTEC project**, we were able to **formulate anodes and cathodes** for Li-ion batteries **using "traditional" ceramics** (LTO/LCO) combined with **liquid $LiPF_6$ electrolytes** to assembly a full pouch cell.*

Ceramic	LCO		LTO	
Type of Electrode	*Reference*	*Printed*	*Reference*	*Printed*
Surface capacity (mAh/cm^2)	3.4	17.7	1.43	11.3

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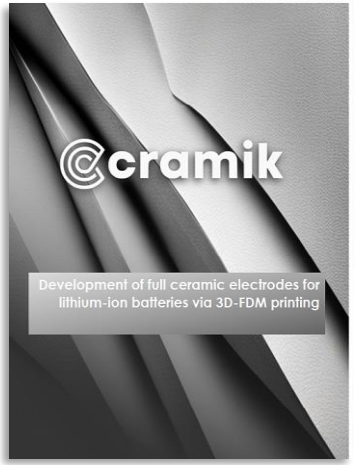
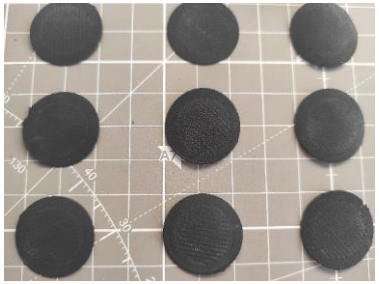
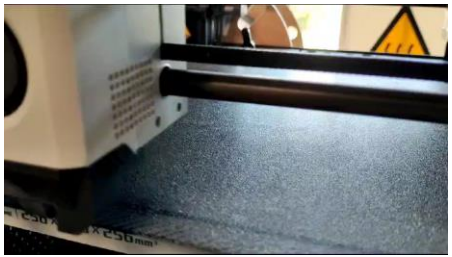






In this phase of the company, our aim is to include in the formulation ceramic solid electrolytes, to test new raw materials with better electrochemical properties and assembly a full ceramic SSB.

Schedule

Tentative starting date is January 2025, with an **expected duration of 12 months**.

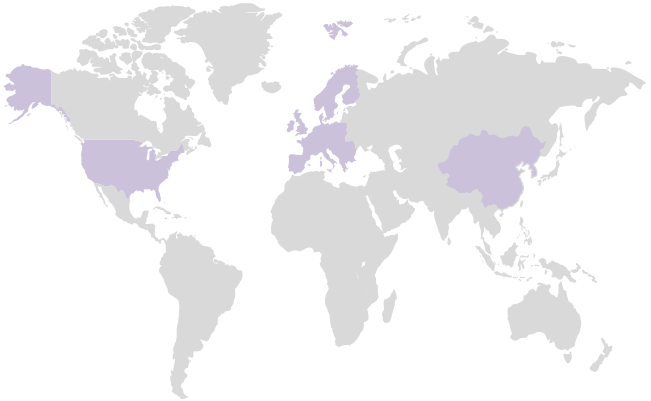
Q1 of 2025 – Definition, iterations and optimization of printable formulations.

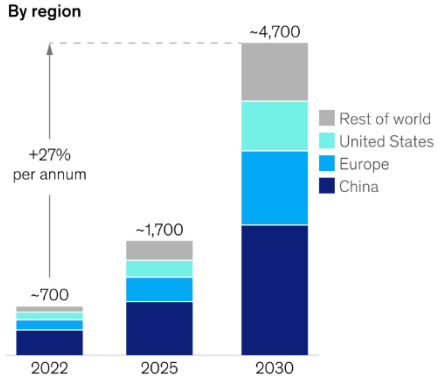
Q2 and Q3 of 2025 – Electrochemical characterization of printed ceramic electrodes and electrolytes. Comparison with the state of art and the performance of traditional electrodes.

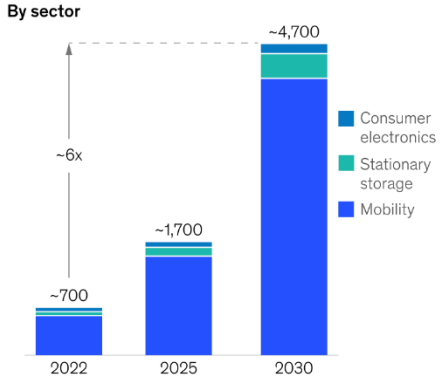
Q4 of 2025 – Printing of a full SSB prototype and determination of the main electrochemical properties.

Impact - Market overview

Li-ion battery demand is expected to grow by about 27 % annually to reach 4.7 TWh by 2030







2022

700 GWh

85 billion $

2030

4700 GWh

400 billion $

BoDAM *(Battery on Demand for Additive Manufacturing)*

CRAMIK

Partners

The main goal is to produce at large scale SSB's using CRAMIK materials with an industrial partner specialized in 3D printing manufacturing technologies.

- We are a materials company **looking for technogical partners** aimed to implement and/or adapt **their manufacturing capabilities** to our products.

- **We are also interested on technical companies with influence in energy applications** that can provide us with valuable feedback on our formulations performance to achieve a fine tuning of electrical properties.

...Combining our know-how with the right partner...

ONE-STEP printing of a full SSB battery using multi-head technologies on a unique printer

Do you want to know more?

Contact point

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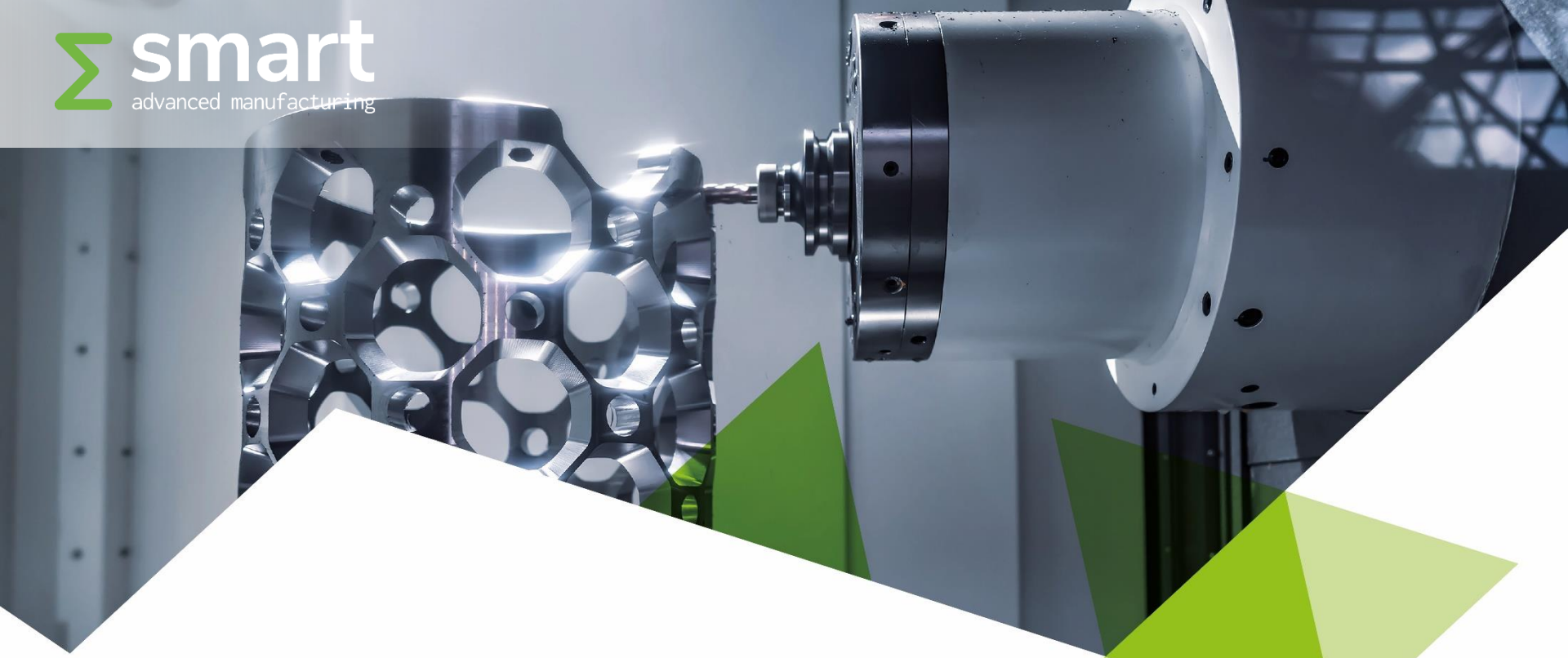

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