JORNADA D'ECOSISTEMA DE TRANSFERÈNCIA
I INNOVACIÓ EN ENERGIA

XRE4S
XARXA d'R+D+I
ENERGY FOR SOCIETY

TRANSHENER

IREC
Shaping Energy for a Sustainable Future

Colloidal inks for Superconductors (HTS-INKS)
SUMAN group

ICMAB
INSTITUT DE CIÈNCIA DE MATERIALS DE BARCELONA
EXCELENCIA SEVERO OCHOA

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

Barcelona, 21st June 2023

Dr. Mar Tristany

suman
SUPERCONDUCTING MATERIALS AND FUNCTIONAL NANOENGINEERED STRUCTURES

CHALLENGES

Change of the energy paradigm to drastically **reduce CO_2 emissions**

Global **electricity demand** will **increase by 20%** between 2019-2030

<u>Opportunities for cleantech energy</u> :
allow energy harvesting and transport electric power **with minimal losses**

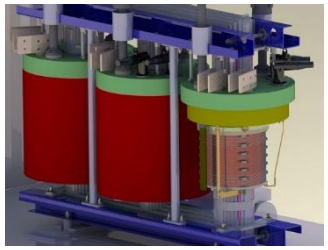
limited by **the high cost/performance ratio** of existing manufacturing processes

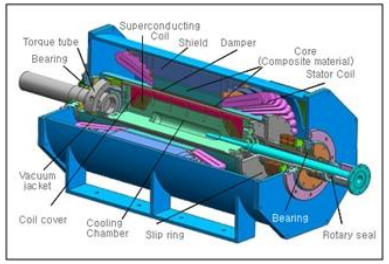
HTS-INKS => lowering current costs of the HTS manufacturing processes and increasing efficiency

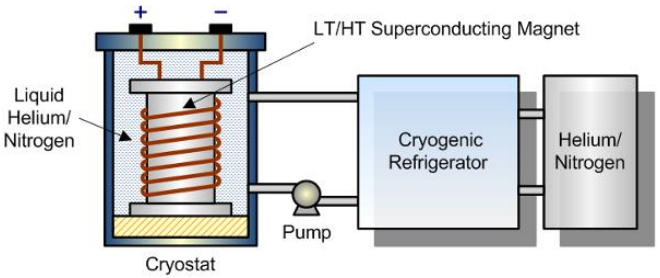
MARKET

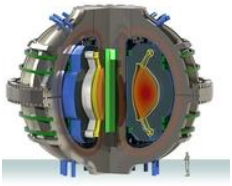
SUPERCONDUCTOR MARKET

Energy Applications



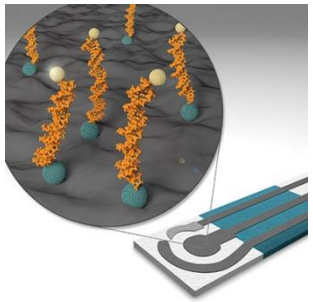


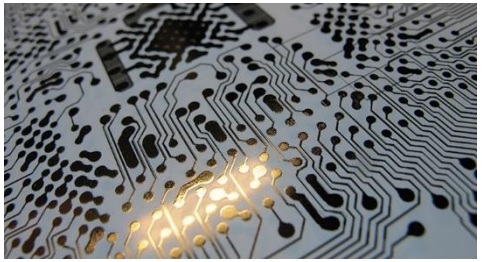




cables transformers motors generators magnetic energy-storage compact fusion devices

CONDUCTIVE INKS MARKET



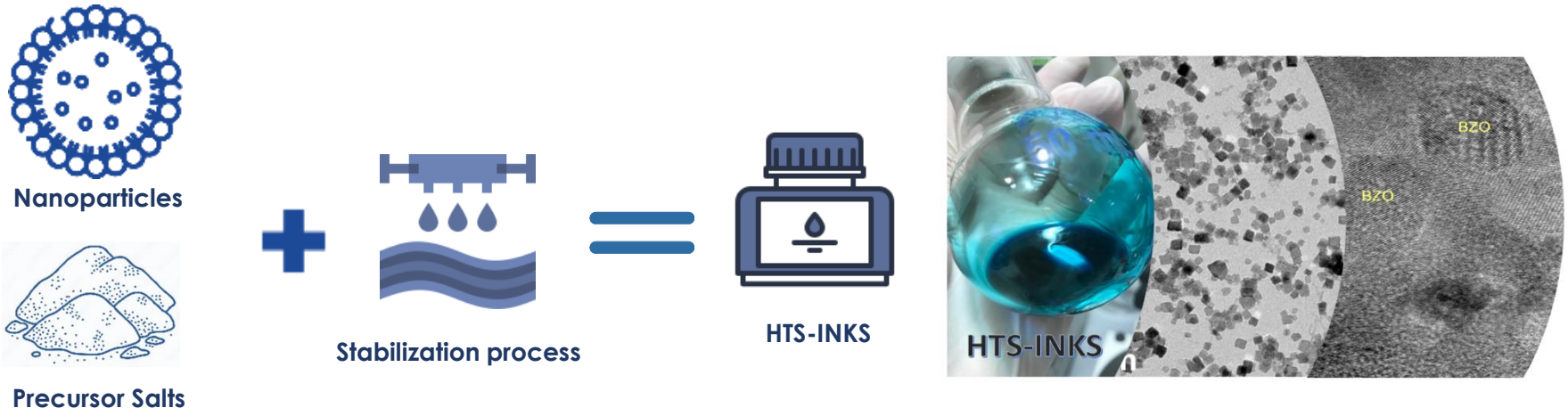


photovoltaics, displays, bio-sensors, printed circuit boards

SOLUTION/PRODUCT

A new generation of **large volume colloidal inks** with stabilising agents, which leads to an increase in the solubility of salts and stabilisation of nanoparticles

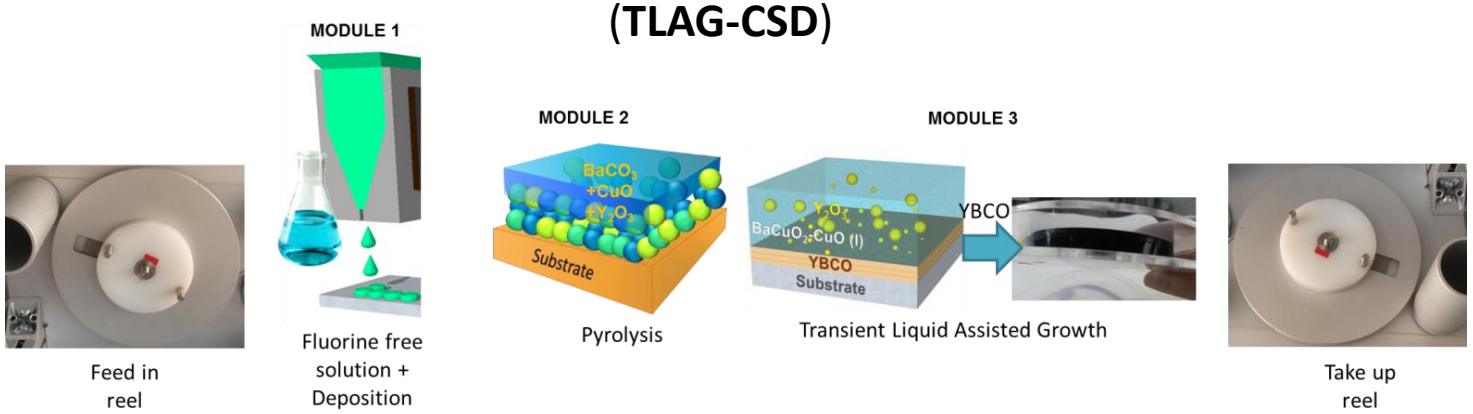
These inks can be customized for different industrial metallic substrates, and could be further expanded to other CSD growth processes



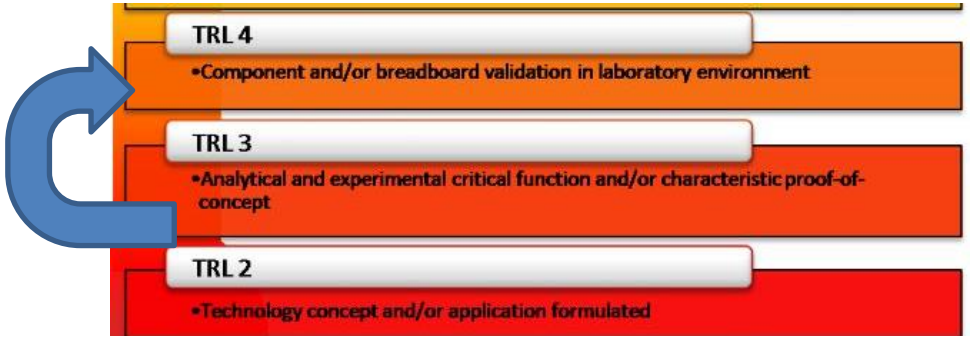
SOLUTION/PRODUCT

Enable the manufacturing scale-up of superconductors at **3-4 times reduced cost**

New Technology: **Transient Liquid Assisted Growth** combined with Chemical Solution Deposition (**TLAG-CSD**)



State of the technology/product:



DEVELOPMENT PLAN

Value Proposition

- Novelty
- Process time
- Versatility

Multifunctional colloidal inks with stabilized nanoparticles

Superconducting tapes with enhanced properties

Adaptable to several metallic substrates and chemical processes

x100 faster production process

DEVELOPMENT PLAN

Further development

(i) Technology

Scale-up the production of the inks (1L) and industrial validation of the superconducting layers deposited (15 cm length and 2 µm thick)

(iii) Strategy

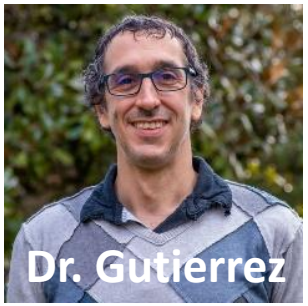
Develop and implement an IP strategy and to build a business case for exploitation

Market

(ii) Commercial

Expand the PI's commercial network and describe the market opportunities in detail

TEAM



Collaborators:

PROJECTS AND IP RIGHTS

SMS-INKS
ERC-PoC
2023-2024: 0.15 k€

ultrasupertape
EU ERC-ADG
2015-2022: 2.5M€

Impact
EU ERC-POC
2020-2021: 0.15 k€

PID: 2022-2025, 0.44 k€
PDC: 2022-2024, 0.15 k€
TED: 2023-2024, 0.27 k€

Work is supported by

Protocols of Transient Liquid Assisted Growth of REBa2Cu3O7 films, nanocomposites and Coated Conductors. *T. Puig , X. Obradors, S. Ricart, et al.* Registration number: 67/2021, 15/01/2021, CSIC, Spain

Precursor solution suitable for the preparation of high performance epitaxial REBa2Cu3O7-x superconductors. *T. Puig , X. Obradors, S. Ricart, et al.* Registration number: EP22382741, 29/07/2022, CSIC, Spain

FUTURE NEEDS

- **Feedback from the market** to adapt the final characteristics of the technology
- **Collaborations to scale-up the technology**

Partners or companies already talking with:

Kao Chimigraf

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Con financiación de: