SAKARYA ÜNİVERSİTESİ

Doç. Dr. Tuğrul Çetinkaya

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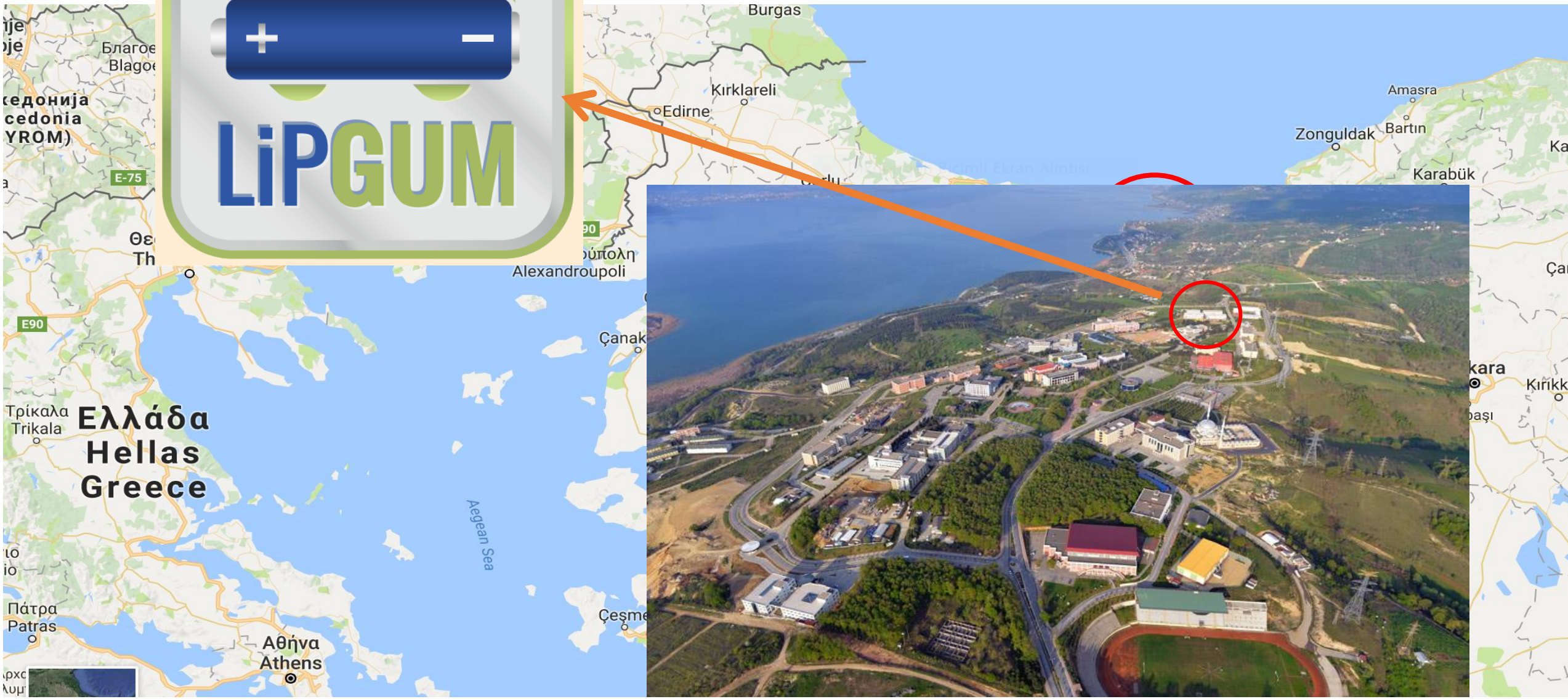
Sakarya Üniversitesi, Mühendislik Fakültesi, Metalurji ve Malzeme Müh. Böl. Öğretim Üyesi

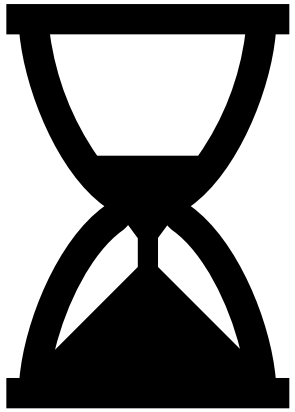
NESSTEC Enerji ve Yüzey Teknolojileri A.Ş. Kurucu Ortağı

Lithium Battery Research, Development and Application Center



	Lisans	Yüksek Lisans	Yüksek Lisans	Doktora	Dr. Araştırmacı
1986	2008	2009	2010	2015	2017
Ankara	Sakarya	Ostrava	Sakarya	Sakarya	Manchester

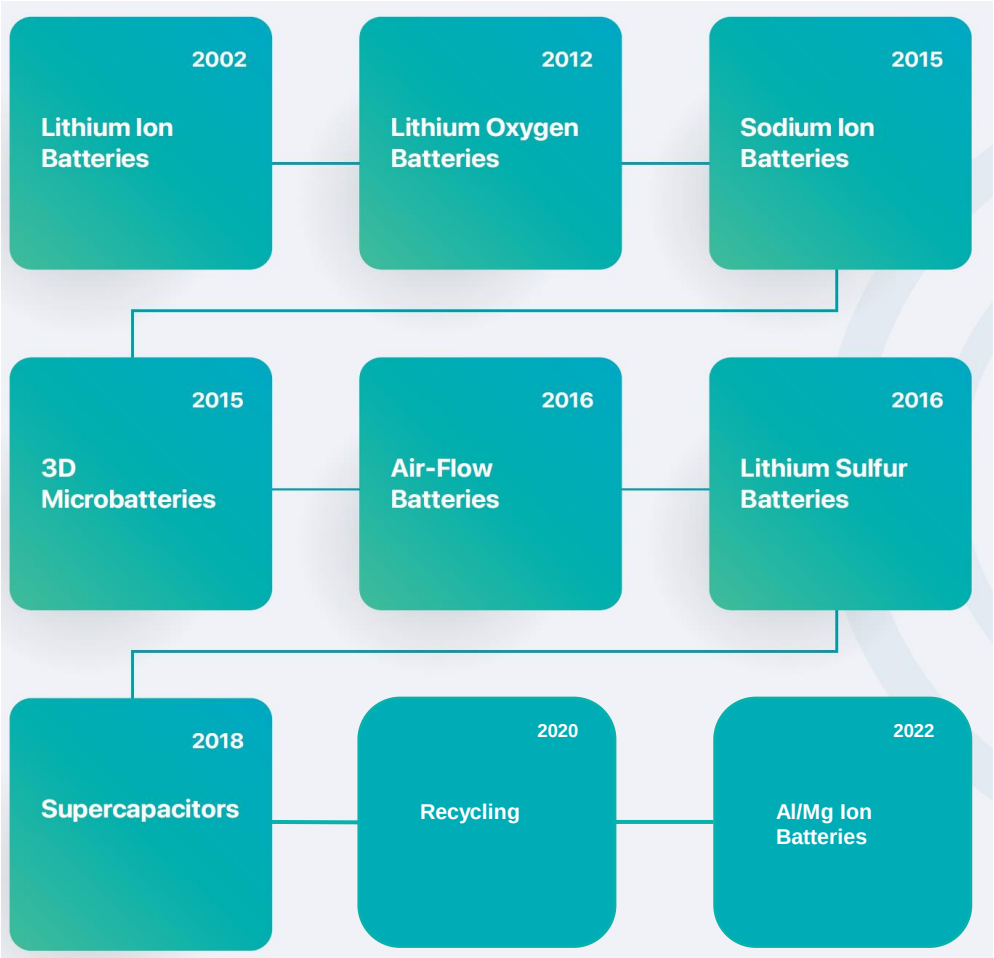
Dr. Öğr. Üyesi	Doçent			
2017	2018	2020	?	
Sakarya	Sakarya			

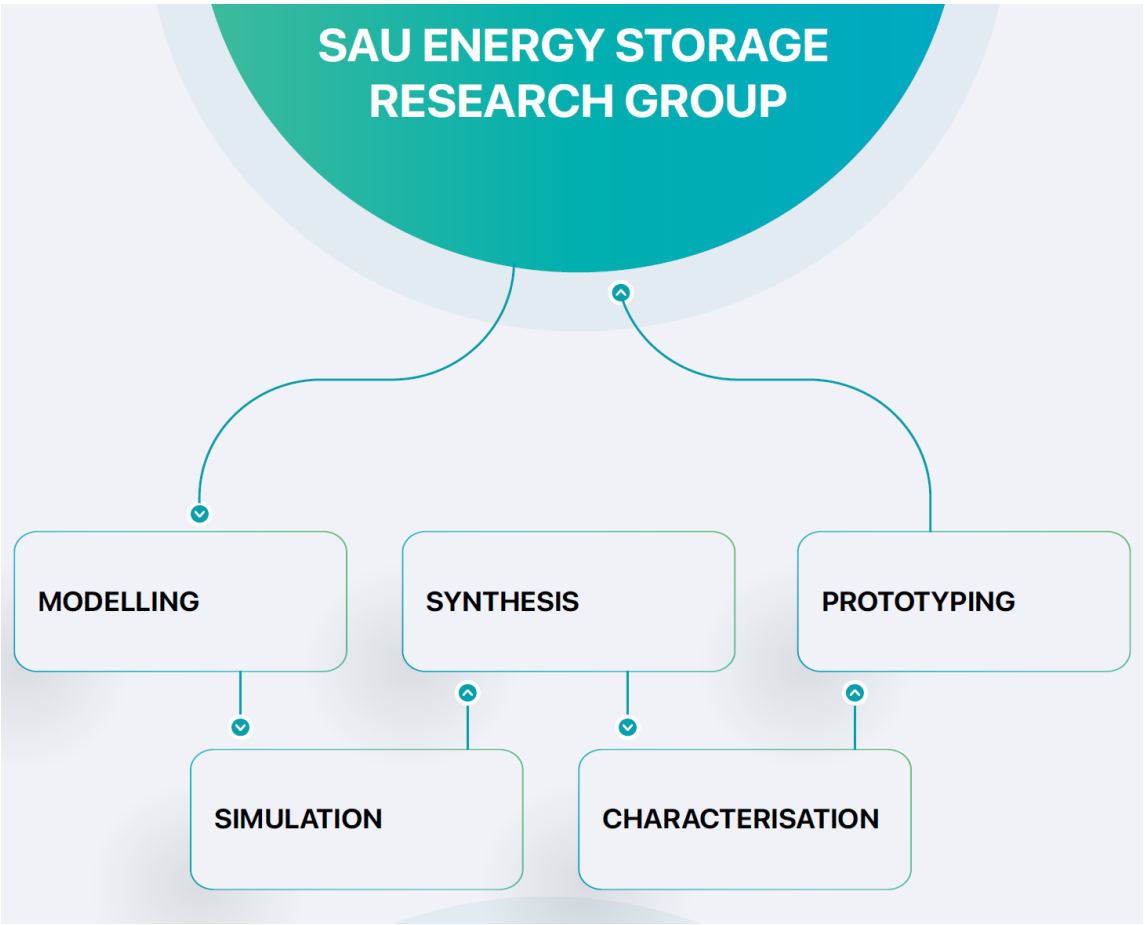


TRL 1’den TRL 5-6’ya

Sakarya Üniversitesi: TRL 1 – 3 (4)

NESSTEC: TRL 3(4) – 5 (6)





Geçmiş, Brikim, Tecrübe

..at Sakarya University

.. since 2002

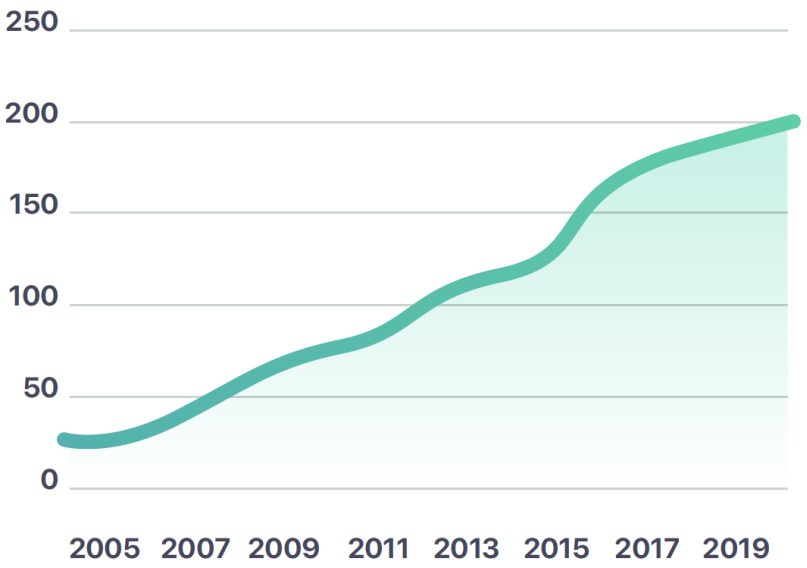
..with

3 Prof. Dr.
6 Assoc. Prof.
10 Asst. Prof.
21 PhD Students
41 MSc Students
72 BSc Students
12 Visiting Scholars
8 International Researchers

..Published More than;

100 Scientific Papers
10 Book Chapters
400 Conference Proceedings
130 Theses

Cumulative Publications



Cite Score

Ekosistemin içinde olmak

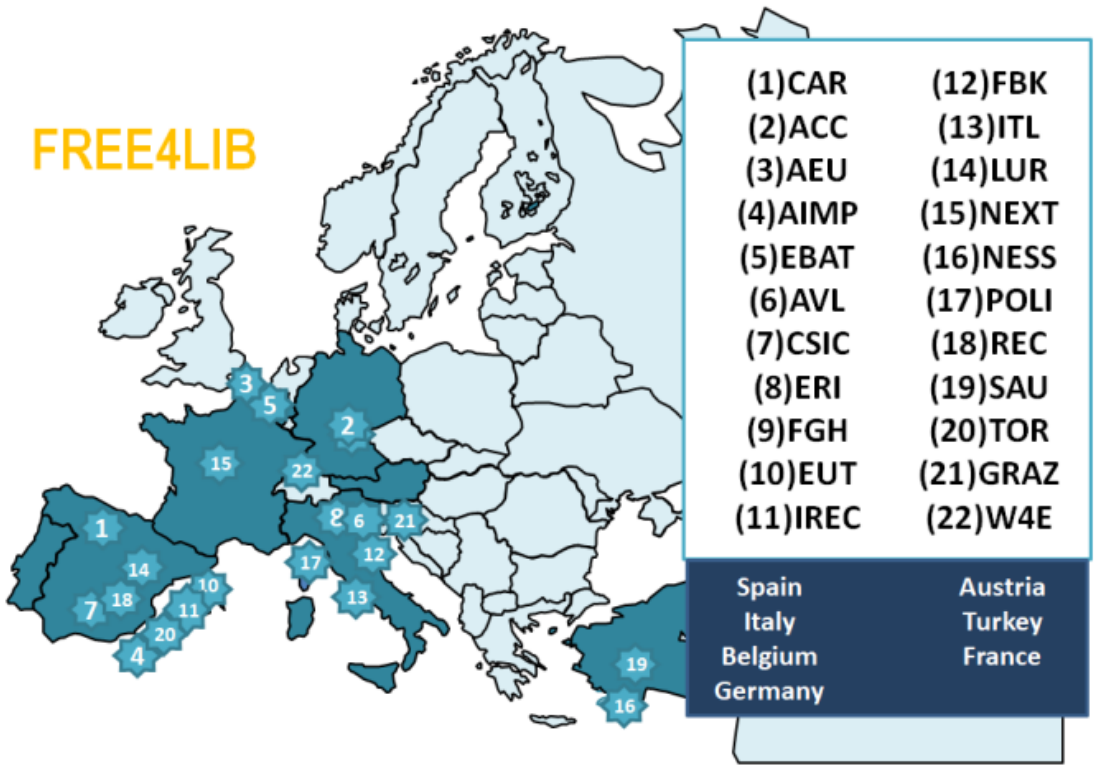
BEPA 5th General Assembly

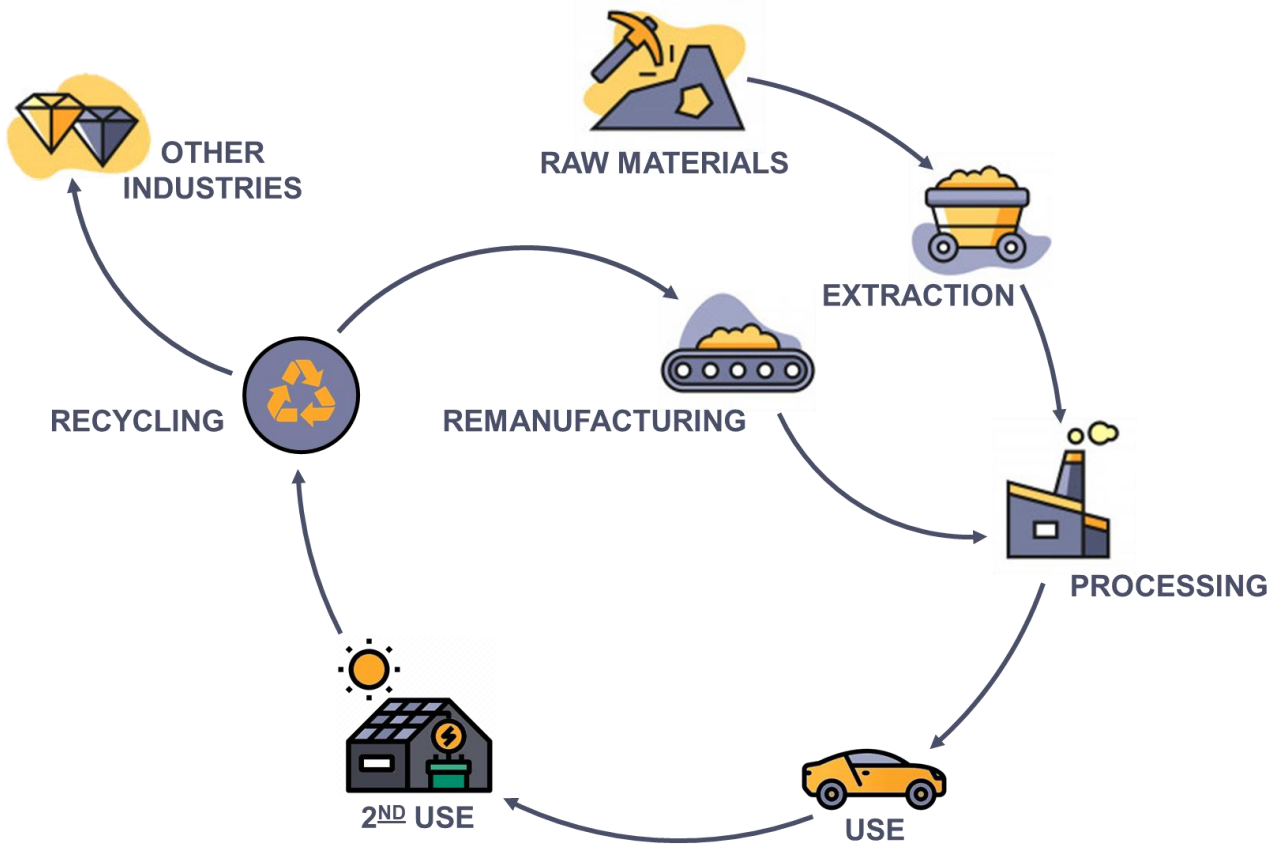
BEPA
Batteries European Partnership Association

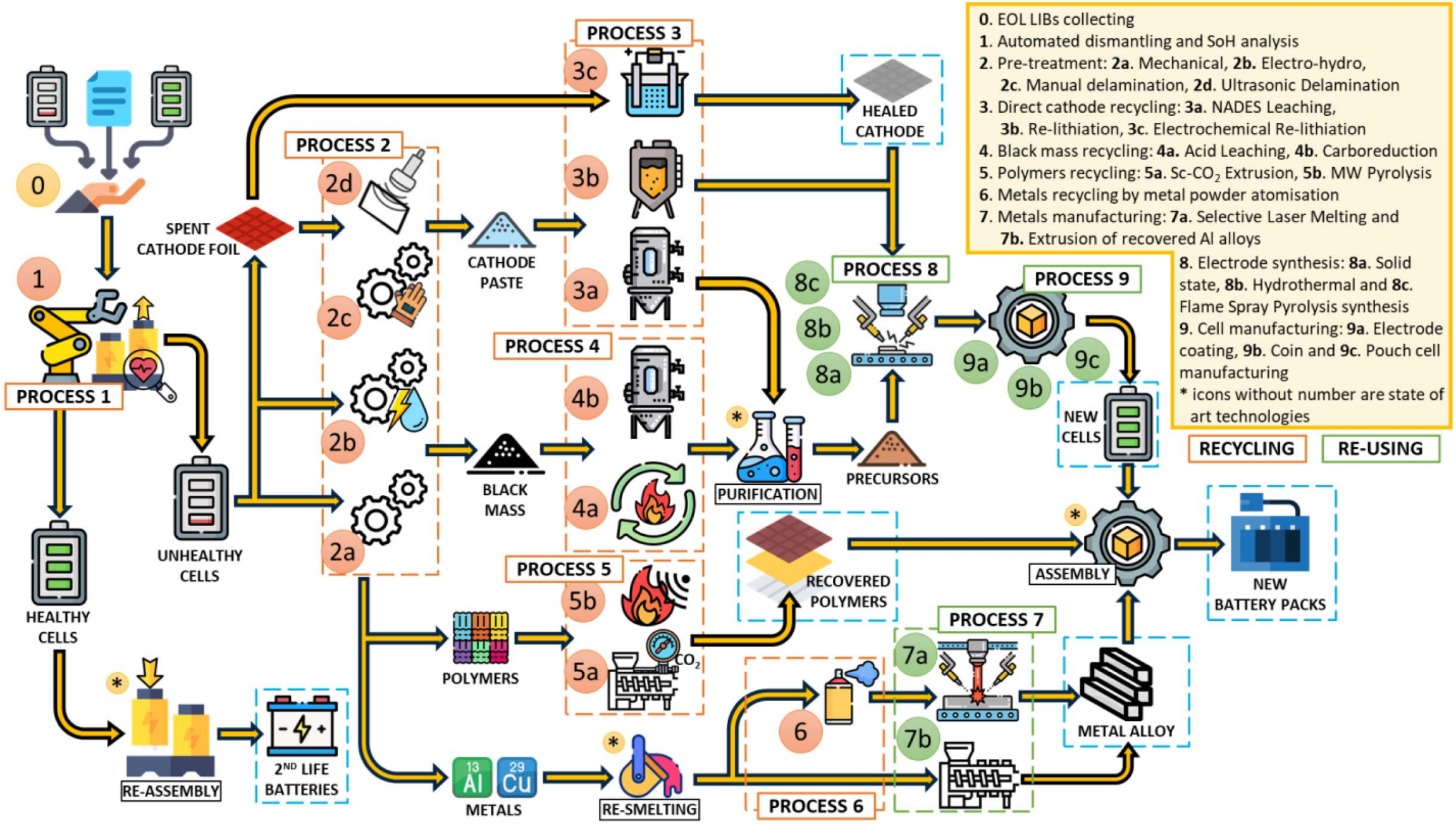
Call: [HORIZON-CL5-2021-D2-01-06] — [Sustainable, safe and efficient recycling processes (Batteries Partnership)]

FREE4LIB

FEASIBLE RECOVERY OF CRITICAL RAW MATERIALS THROUGH A NEW CIRCULAR ECOSYSTEM FOR A LI-ION BATTERY CROSS-VALUE CHAIN IN EUROPE






0. EOL LIBs collecting
1. Automated dismantling and SoH analysis
2. Pre-treatment: 2a. Mechanical, 2b. Electro-hydro, 2c. Manual delamination, 2d. Ultrasonic Delamination
3. Direct cathode recycling: 3a. NADES Leaching, 3b. Re-lithiation, 3c. Electrochemical Re-lithiation
4. Black mass recycling: 4a. Acid Leaching, 4b. Carboreduction
5. Polymers recycling: 5a. Sc-CO_2 Extrusion, 5b. MW Pyrolysis
6. Metals recycling by metal powder atomisation
7. Metals manufacturing: 7a. Selective Laser Melting and 7b. Extrusion of recovered Al alloys
8. Electrode synthesis: 8a. Solid state, 8b. Hydrothermal and 8c. Flame Spray Pyrolysis synthesis
9. Cell manufacturing: 9a. Electrode coating, 9b. Coin and 9c. Pouch cell manufacturing
* icons without number are state of art technologies
RECYCLING
RE-USING
PROCESS 1
PROCESS 2
PROCESS 3
PROCESS 4
PROCESS 5
PROCESS 6
PROCESS 7
PROCESS 8
PROCESS 9
SPENT CATHODE FOIL
CATHODE PASTE
BLACK MASS
POLYMERS
METALS
HEALTHY CELLS
UNHEALTHY CELLS
RE-ASSEMBLY
2ND LIFE BATTERIES
HEALED CATHODE
PURIFICATION
PRECURSORS
RECOVERED POLYMERS
RE-SMELTING
METAL ALLOY
ASSEMBLY
NEW CELLS
NEW BATTERY PACKS
CO_2

HORIZON-EIC-2022-PATHFINDEROPEN-01

Al/Mg Ion Batteries

SAKARYA ÜNİVERSİTESİ

GENERAL COORDINATOR OF THE PROJECT

Assoc. Prof. Dr. Tuğrul Çetinkaya

NESSTEC

New Energy Storage Systems & Surface Technologies

BATTERY MANUFACTURING TECHNICAL COORDINATOR

Konsorsiyum oluşturma çalışmaları

- HORIZON-EIC-2023-PATHFINDEROPEN: İtalya, İngiltere, Türkiye, Polonya

- HORIZON-EIC-2023-PATHFINDEROPEN: Türkiye, Belçika, Fransa, İspanya

Konsorsiyum oluşturma çalışmaları

HORIZON-CL5-2023-D2-01-02: New processes for upcoming recycling feeds (Batt4EU Partnership)

- **Scope:** The development of recycling technologies targeting upcoming recycling feeds and producing high quality precursors, semi-products and battery materials enabling their use in the battery production and other production processes.

HORIZON-CL5-2023-D2-01-03: Advanced digital twins for battery cell production lines (Batt4EU Partnership)

- Scope: Developing digital twins of battery cell manufacturing routes at pilot line level that incorporate appropriate models but also their connection to real manufacturing plants, e.g. to support process development and operation, battery cells optimisation, accelerate the set-up of effective manufacturing processes for the next generation battery cells or to demonstrate the capability for predictive maintenance.

HORIZON-CL5-2023-D2-02-01: Advanced materials and cells development enabling large-scale production of Gen4 solid state batteries for mobility applications (Batt4EU Partnership)

- Scope: Integrate high voltage cathode (> 4V), Propose and evaluate interfaces and coating solutions especially to suppress dendrite, growth and enable a stable solid-electrolyte interphase (SEI) and cathode-electrolyte interphase (CEI)., Anode current collectors and/or solid electrolyte capable of accommodating volume changes upon charge/discharge

- Demonstrate the potential for scale up of materials, cells and sustainable industrial processing methods with cells reaching a capacity of several Ah, produced in a statistical meaningful number to demonstrate the process repeatability.

HORIZON-CL5-2023-D2-02-02: New Approaches to Develop Enhanced Safety Materials for Gen 3 Li-Ion Batteries for Mobility Applications (Batt4EU Partnership)

Scope: Doping strategies or surface coating materials leading to more robust and effective cathode electrolyte interphase (CEI). Design of high-capacity cathode materials based on safer chemistries (e.g. stabilized Li-rich layered oxides, disordered rock salts, polyanionic materials…).

Design high-voltage cathodes and high voltage anodes in order to combine them in a high energy cell, with sufficiently high operating voltage to avoid stripping/plating of lithium. Innovative approaches of cathode structuring to mitigate heat generation, including with toxic gas releases, in abuse conditions.

Design and development of new systems with higher standard potential compared to lithium stripping/plating. (High SiOx, Si/C, etc. content).

Surface coating materials for more robust and effective SEI. New approaches to minimize material/anode swelling and expansion during cycling, including anode manufacturing (polymeric and ceramic coating-based approaches, etc.) and structuring the anode-current collector interface.

Dinlediğiniz için teşekkürler

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