Project concept

PS-fabs - **P**FA**S** in the microelectronics and battery **fab**rication processes for the automotive **s**ector

Summary

Per- and polyfluoroalkyl substances (PFAS) present significant environmental and health risks, the search for PFAS alternatives is crucial for minimizing health risks and adhering to foreseen regulatory requirements. The Project is expected to make safe and sustainable PFAS alternatives available for industries as well to provide access to knowledge about PFAS alternatives.

This proposal in this outline focuses on **developing alternatives to PFAS containing products and processes**. Automotive applications, particularly in the realm of **microelectronics** (MEMS) and **electric vehicle (EV) batteries**, can benefit from **innovative materials** that provide similar functional properties without the adverse effects associated with PFAS.

The proposed project will aim **to new material innovations on PFAS alternatives** through:

- **Innovative materials,** fluorine-free, bio-based (e.g. cellulose and lignin) and advanced polymers are emerging as sustainable binder alternatives for lithium-ion batteries. These materials show promise in replacing PFAS-containing binders, making battery production more environmentally friendly.
- **AI based material design** through computational methods such as molecular dynamics and density functional theory to model and predict the behavior of alternative materials at the atomic level. This approach aids in identifying suitable substitutes that maintain performance and safety standards, enabling researchers to simulate interactions and optimize material properties before experimental validation.
- **Digital twin development** for creating digital representations of physical assets to simulate and analyze performance, enabling better decision-making with respect to **safe-and-sustainable by design** (**SSbD**)
- **Demonstrating the application** of PFAS-free binder alternatives in **battery cells** and implementation of **PFAS-free process chemicals in semiconductor/ MEMS** process (detailed scope to be defined)

Call information (based on the draft document)

Call: HORIZON-CL4-INDUSTRY-2025-01-MATERIALS-51: Development of safe and sustainable alternatives to PFAS (IA) (draft)

Deadline:	September 2025
Project duration:	3 to 4 years
Budget:	Max. about 7 Mio. EURO
Technology Readiness Level (TRL):	Start TRL 3-4, achieve TRL 6-7 by end of project

Project structure (tentative)

WP1 Material design– AI & atomistic simulations supported material design for battery binders (VTT), other applications

WP2 Material development - cellulose based battery binders (VTT), semiconductor process materials

WP3 PFAS free batteries for automotive (EV) applications* (VTT, CSEM)

WP4 PFAS free semiconductor processes* – (VTT, CEA, CSEM, 1- 3 example processs)

WP5 Pilot demonstration (industrial lead e.g. Fiat)
a) batteries
b) microelectronics

WP6 Digital infrastructure for SSbD (VTT, FhG)

WP7 Dissemination & exploitation

WP8 Stakeholder interaction - support to policies & legislation

WP9 Project management

Project consortium

Organization	Role (to be elaborated)	Contact
VTT, Technical Research Centre of Finland (FI)	Proposal coordination, battery/ MEMS fab, AI based material design	Maria Smolander (maria.smolander@vtt.fi)
Fraunhofer IPMS (DE) and Fraunhofer IKTS (DE)	Cleanroom processes and products, pilot fabrication and testing Algorithms and data handling for multiple modalities, digital systems PFAS analytics and destruction with electrolysis	Thomas Stoppe (thomas.stoppe@ipms.fraunhofer.de)
CEA-LETI (FR)	Process development in microelectronics	Isabelle Servin (isabelle.servin@cea.fr)
CSEM (CH)	Microelectronics/ Batteries	TBC
CRF (FIAT) (IT)	EV batteries	Giovanna Nicol, giovanna.nicol@crf.it

Partner search

- The consortium is looking for **company partners** e.g. for chemical design and production, MEMS/ semiconductor/battery fabrication, digitalisation of SSbD, implementation of SSbD principles
- **Specifically needed are partners with microelectronic products and processes that are in search for alternatives**