Greenet

The network of Horizon Europe Cluster 5 National Contact Point.



Crystallization process understanding & design

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GREENET Brokerage Event

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Politecnico di Torino

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Profile & Expertise

- Elena Simone, Professor of **Chemical Engineering**
- Politecnico di Torino (public university), **Italy**
- Expertise:
  - ***Crystallization process design*** for optimal recovery yield and purity (complex media, organic & inorganic species)
  - ***Monitoring techniques and control strategies (e.g, model-free, machine learning)*** for continuous and batch multiphase processes (Process Analytical Technology, PAT tools)
  - Design of ***crystalline materials with tailored functionality*** (Crystal Engineering tools - modeling & experimental advanced material characterization)
  - ***Multiphase process modelling*** (population balance equations, CFD, molecular modelling)

Slected projects & collaborations

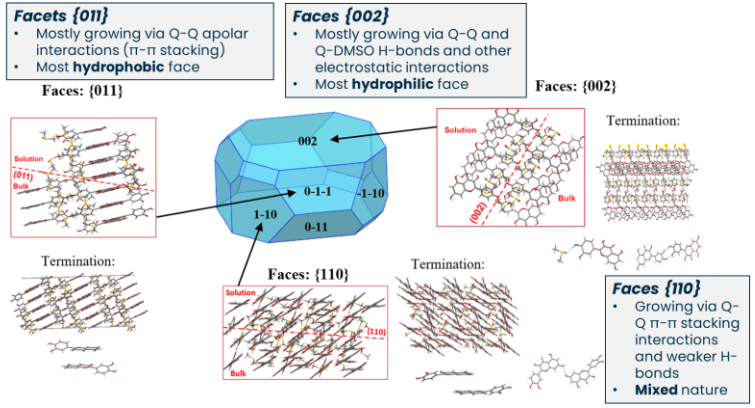
- Design of crystalline materials for multiphase formulations (food, pharma, agrochemical) – ERC StG Cryform
- Understanding multicomponent inorganic & organic crystallization processes – with Lavazza, Syngenta, FIS and Nestlé
- Waste valorization – PNRR Agritech
- Novel crystalline materials for food applications – ERC PoC NewOilFactory
- Crystal Engineering & complex material modelling – with CCDC

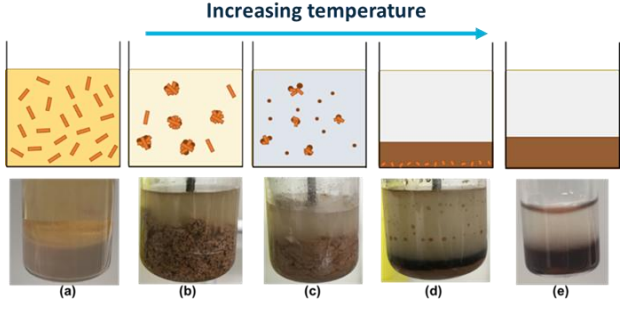
ERC StG – CryForm

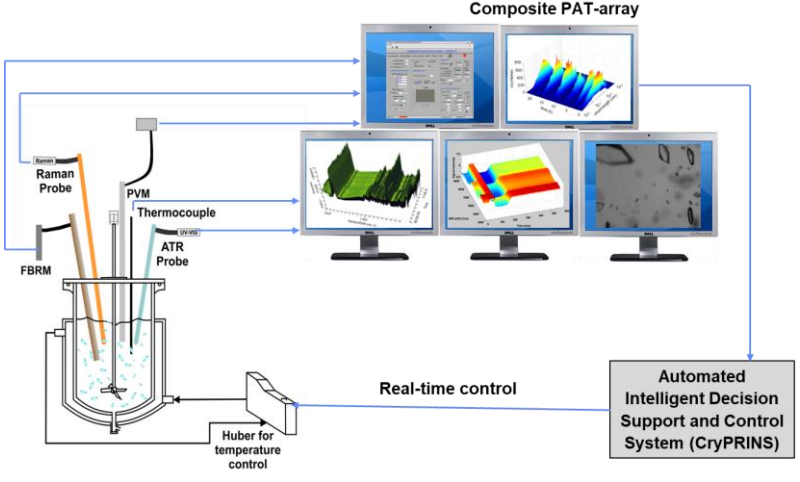
ERC PoC - NewOilFactory

Relevant previous work

- PAT based monitoring of crystallization
- Machine learning applied to PAT tools signal for in situ monitoring of crystallization
- PBE to develop a digital twin for batch crystallization processes
- Model-free feedback control strategy based on combinations of PAT tools for multiphase, multicomponent processes
- Modelling and experimental crystal engineering to tailor bulk and surface properties of crystalline materials







Possible topic contributions

Topics of interests within the "Cross-sectoral solutions for the climate transition" destination 2:

- HORIZON-CL5-2025-02-D2-02: Cost effective next-generation batteries for long-duration stationary storage (Batt4EU Partnership) – **crystalline materials design and characterization**
- HORIZON-CL5-2025-02-D2-03: Sustainable processing and refining of raw materials to produce battery grade Li ion battery materials (Batt4EU Partnership) – **crystallization to produce and recover battery materials, PAT tools for process control**
- HORIZON-CL5-2026-01-D2-01: Development of sustainable and design-to cost batteries with (energy-)efficient manufacturing processes and based on advanced and safer materials (Batt4EU Partnership) **– recovery of materials using crystallization**
- HORIZON-CL5-2026-01-D2-04: Integrating advanced material, cell design and manufacturing development for high performance batteries aimed at mobility (Batt4EU Partnership) - **crystalline materials design and characterization**