

CHEMICAL ENGINEERING

DISAT - Understanding the mechanism of crystallization at interfaces

Funded By	Dipartimento Scienza Applicata e Tecnologia [Piva/CF:00518460019]
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Context of the research activity	Crystallization is a natural phenomenon (e.g., ice formation) but also an important unit operation for many industrial sectors such as the food and pharmaceutical industries. Despite its popularity some aspects of crystal nucleation and growth are still unclear. The aim of this project is to understand the effect of interfaces of different nature (e.g., liquid/liquid, gas/liquid) on the mechanism and kinetics of nucleation of small organic molecules such as pharmaceuticals or food ingredients.
Objectives	The prospective student will join the Crystal Engineering and Crystallization Group at PoliTO and, they will contribute to the project Cryform (https://cordis.europa.eu/project/id/949229) , led by Dr Elena Simone and funded by the European Research Council. In the context of CryForm the student will apply computational chemistry and experimental techniques to gain insight on the phenomenon of crystallization at interfaces such as liquid/liquid or gas/liquid ones. These types of interfaces are common in dispersions of bubbles or droplets, which are often found in chemical processes, but they are also the main component of complex soft materials such as foams or emulsions. Understanding crystallization phenomena at interfaces can enable better control of industrial processes, as well as the design of novel soft materials where crystalline particles coexisting with droplets or bubbles can impart tailored physical and functional properties to the final product. During the project the student will have the chance to work with advance characterization techniques such as confocal Raman microscopy, X-ray scattering and tomography (benchtop and synchrotron) and scanning electron microscopy. The Crystal Engineering and Crystallization laboratory at PoliTO is equipped with instrumentation for the synthesis and characterization of crystals and crystalline based materials at scale from the microliter (CrystalBreeder, Crystal16) to the liter. Collaboration with international partners (University of Toulouse in France, KU Leuven in Belgium ect.) are expected during the project, as well as attendance to conferences and training schools.
Skills and competencies for the	The desired candidate will have an MSc in Material Science, Physics, Chemistry or Pharmaceutical Technologies. Experience in crystallization or

**development of
the activity**

formulation science is a plus.