



MASTER

CHEMISTRY
Specialization
Crystallization



OBJECTIVES

The specialization CRYSTALLIZATION proposed in the Master of Chemistry at the University of Rouen Normandie is **unique in France**.

This formation proposes a multi-disciplinary training based on a **fundamental and applied** approach of the CRYSTALLIZATION process.

This complex physico-chemical process is central to **separation operations, purification or fabrication of materials with controlled properties** in various industrial fields (fine chemicals, pharmaceutical industry, semi-conductors, cosmetics, ...).

The graduated student will possess the theoretical and experimental knowledge allowing him/her to understand classical methods of crystallization and design new ones suitable for the considered materials and the targeted applications..

TARGETED SKILLS

The Master of Chemistry - specialization Crystallization will enable the students who follow this training to:

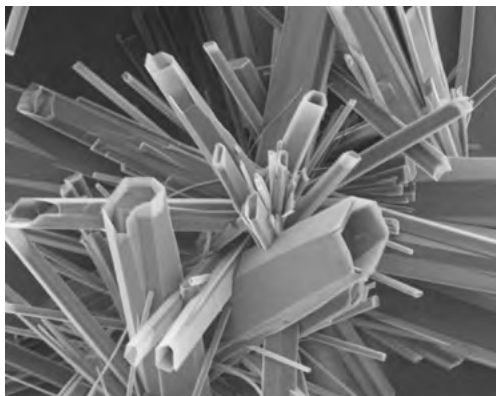
- Understand the fundamental mechanisms involved in the phenomenon of crystallization
- Acquire the fundamental and practical knowledge for analyzing and describing the solid state
- Get a multi-disciplinary knowledge of the crystallization process and manufacture of solid materials
- Be familiar with industrial crystallization processes (separation, purification, final processing)
- Propose and design crystallization methods suitable for a given issue.



ADMISSION CONDITIONS

Admission in first year of Master (M1)

- For students who obtained their bachelor degree (Licence) in a French or foreign university in chemistry, physical chemistry, physics or an equivalent degree, the admission is subjected to the evaluation of an application file by a validation commission.



Admission in second year of Master (M2)

- Direct admission for Students who validated their M1 Chemistry at the University of Rouen Normandie.
- Subjected to the evaluation of an application file by a validation commission for:
 - Students who validated a M1 Chemistry or M1 Chemistry and Materials Sciences in another French University.
 - Students in French School of Engineering who are willing to follow a double cursus during their fifth year.
 - Students from foreign Universities who justify of getting knowledge and skills equivalent to those obtained in a M1 Chemistry of M1 Chemistry and Materials Sciences.
 - Employees from industry who are willing to obtain a degree equivalent to the M2 via a "VAE" or the "formation tout au long de la vie" (in the framework of the personal training account). Only employees of French companies are eligible to these training options.

PROGRAMME AND CONTENTS

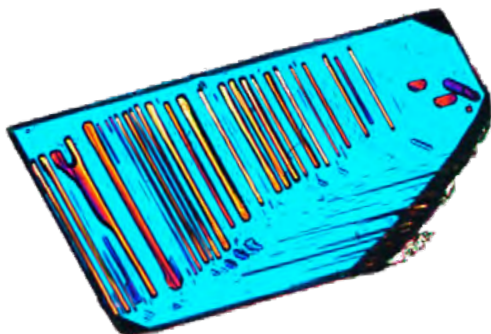
M1

Semestre 1

- English (2 CE)
- Preparation to professional integration (1 CE)
- Tutored project * (2 CE)
- Physico-chemistry of polymers (6 CE)
- Chemistry of non-metals and chromatography (6 CE)
- Quantum chemistry and chemical modeling (4 CE)
- Organic chemistry (6 CE)
- Optional course (1 choice among 2) (3 CE)
 - RMN et mass spectrometry
 - Solid state chemistry

Semestre 2

- Analytical and applied electrochemistry (6 CE)
- Chemistry specialization 1 (among 2 choices) (6 CE)
 - Synthesis of natural products
 - Polymer materials and dispersed systems
- Chemistry specialization 2 (among 2 choices) (6 CE)
 - Methods and strategies in organic synthesis
 - Inorganic materials
- Chemistry specialization 3 (among 2 choices) (6 CE)
 - Analysis and spectrochemistry
 - Fundamentals of crystallization
- Chemistry specialization 4 (among 2 choices) (6 CE)
 - Natural macromolecules
 - Spectroscopy, spectrometry and modeling



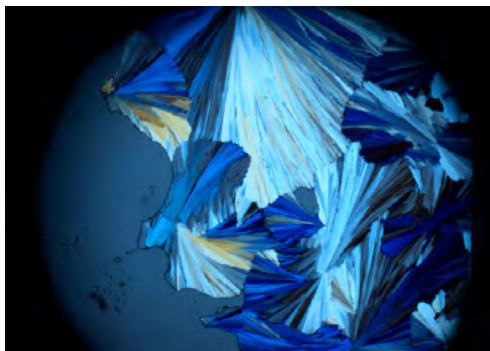
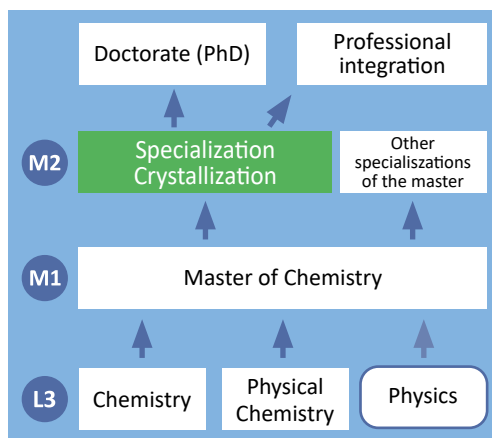
M2

Semestre 3

- Fundamentals about the solid state (4 CE)
- Metallic solid state (3 CE)
- Crystallization processes (7 CE)
- Molecular solids (6 CE)
- Characterization of polymers (5 CE)
- Crystalline inorganic materials (5 CE)

Semestre 4

- English (3 CE)
- Professional integration (1 CE)
- Communication and industrial environment (1 CE)
- Internship ** (25 CE)



* Research project to be realized during 5 weeks in a research laboratory

** Internship of ca. 6 months achieved in an academic laboratory or in industry France or foreign countries

LABORATORIES

Research laboratories associated to the Master of Chemistry specialization Crystallization:

Laboratoire Sciences et Méthodes
Séparatives, EA 3233
<http://labsms.univ-rouen.fr>



Laboratoire de Cristallographie et
Sciences des matériaux, UMR 6508
<http://www-crismat.ensicaen.fr/>



Laboratoire Polymères
Biopolymères Surfaces,
UMR 6270
<http://pbs.univ-rouen.fr/>



Laboratoire Catalyse et Spectrochimie
UMR 6506
<http://www-lcs.ensicaen.fr/>

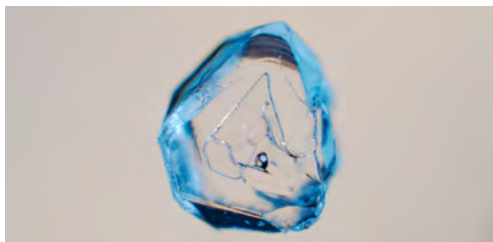


CAREER OPPORTUNITIES

Fields: pharmaceutical industry, fine chemicals, ceramics, cosmetics, agrochemical industry, mineral wastes treatment and valorization.

Positions in academia: research engineers, researcher, associate professor (after three years of PhD)

Positions in Industrial/private companies: executive, project or service leader, design or research engineers, consulting engineers/experts in the field of intellectual property.



Professors in charge of the Master

Yohann Cartigny et Samuel Petit

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Laboratoire SMS

Sciences et Méthodes Séparatives

<http://labsms.univ-rouen.fr>

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