

## COST Action CA18112 MechSustInd 2<sup>nd</sup> Training School 2020 Second call for trainees

### Basics and analysis of mechanochemical reactions using MS/FT-IR coupled Simultaneous Thermal Analysis and X-ray Sub-Micro-Tomography

Date and location: March 23<sup>rd</sup> to March 26<sup>th</sup>, 2020

Local host: Crystal Engineering Malta (CrEMa) laboratories,  
Dr. Liana Vella-Zarb, Prof. Ulrich Baisch

Address: Malta Life Science Park, San Gwann, SGN 3000, Malta

#### About the school

This course will enable participants to gain basic training in carrying out solid state reactions in general using normal laboratory ball mills. It will also provide training on how to use X-ray microscopy/tomography and thermal analysis coupled with MS and FT-IR to characterise and understand solid-state reactions *in-situ*. This will give newcomers the opportunity to delve into the world of solid-state and mechanochemistry and advanced researchers a possibility to enlarge their analytical skills and expertise by using X-ray micro-tomography and MS/FT-IR coupled simultaneous thermal analysis. Other techniques such as automated crystallisation, hot-stage microscopy, solid-state fluorimetry, powder and single-crystal X-ray diffraction, pore and surface analysis, micro-Raman microscopy and computational prediction methods are available on site and, although not directly part of the training school, be available to complement analysis of own samples. More details are given in the preliminary program below.

The school capacity is 18 trainees.

#### About MechSustInd

COST action CA18112 Mechanochemistry for Sustainable Industry (MechSustInd) aims at community building of mechanochemists across Europe. Education of young researchers, training of specialised scientists, engineers and technologists, promoting excellence and cross-fertilization among different fields is one of the important objectives of the Action.

## Practical details

The training school starts on Monday, March 23<sup>th</sup> 2020 and finishes on Thursday March 26<sup>th</sup> 2020.

Housing for participants is pre-booked in a nearby hostels and hotels, ranging 150-250 EUR per person for 4 nights.

A grant of up to 640 EUR can be provided for participants as a contribution to the travelling costs, accommodation and subsistence during the Training School.

## Application process

Researchers at different ranks are eligible to apply for the training school, including graduate and PhD students, postdoctoral researchers and independent researchers. However, priority will be given to early career investigators (PhD + 8), as well as to trainees from inclusiveness target countries (see [COST ITC](#)), respecting the gender balance.

Applications for the admission to the training school should contain:

- A motivation letter, that provides a clear indication of experience relevant to the topic of the training school; provide a rationale of why you are interested in the training school and how you envisage the training school to contribute to your learning, career and research objectives. (maximum one page)
- A short CV (maximum one page)

Applications for travel grant in addition:

- Estimation of travel costs to and from venue, housing and subsistence
- Short justification for the travel grant (one paragraph)

Commitment for successful applicants for grant prepare after the training school:

- Follow-up report (maximum one page)
- Feedback for the public website of the action (one paragraph)

Apply by sending email with required documentation to both Martin Krupička ([Martin.Krupicka@vscht.cz](mailto:Martin.Krupicka@vscht.cz)) and Liana Vella-Zarb ([liana.vella-zarb@um.edu.mt](mailto:liana.vella-zarb@um.edu.mt)),

**extended deadline February 5<sup>th</sup> 2020.** Please, include **CA18112 TS Application** in the subject field.

## Preliminary programme

### Monday, March 23<sup>rd</sup>

- 12:00 -14:00 Reception/Check-In
- 14:00 Welcome and Introduction (LVZ)  
Assignment of teams  
Prize announcement for best performing group in the final exam and practical part  
Laboratory rules and health & safety guidelines
- 15:00 **L1** Overview on mechanochemistry and methods on how to analyze a sample (TBA)  
How much chemistry is there in mechanochemistry?  
Quick overview *in-situ* methods to follow a solid state reactions; i.e. use your senses (aspect, smell, consistency), XRD, XRM, fluorimetry, Raman, STA-MS, STA-FTIR
- 16:00 Coffee break
- 17:00 **L2** Ball milling vs manual grinding: differences, thermodynamic and kinetic aspects
- 18:00 Closing remarks
- 19:30 Dinner

### Tuesday, March 24<sup>th</sup> - Pharma Day

- 9:00 **L3** Solid-state analytics in pharmaceutical industry and task assignment. (TBA)
- 10:00 **Exp1** Cocrystallisation via ball milling and grinding and for different periods of time
- 12:00 – 13:30 Lunch break
- 13:30 **Exp2** Analysis of the samples
- 16:00 Coffee break
- 17:00 **L4** X-ray microscopy/tomography in materials science (TBA)
- 18:00 Closing remarks
- 19:30 Dinner

### Wednesday, March 25<sup>th</sup> - Pigments

- 9:00 **L5** Solid-state analytics of pigments and task assignment. (TBA)
- 10:00 **Exp3** Pigment synthesis via ball milling and grinding and for different periods of time
- 11:00 **Exp4** In-situ analysis at variable temperature – Part 1  
In-situ XRM/PXRD and STA each groups starts 2 experiments
- 12:00 – 13:30 Lunch break
- 13:30 **Exp5** In-situ analysis at variable temperature – Part 2  
In-situ XRM/PXRD and STA each groups finalizes Part 1 experiments and starts the remaining 2 experiments.
- 16:00 Coffee break
- 17:00 **L6** Coupled thermal analysis in materials science (TBA)
- 18:00 Closing remarks
- 19:30 Dinner

### Thursday, March 26<sup>th</sup> - Bring your own sample

- 9:00 **L7** Complete, publishable characterization of solids: How reliable are my analytical results (TBA)
- 10:00 – 11:00 TEST
- 11:00 **Exp6** Own samples will be analyzed
- 12:00 – 13:30 Lunch break
- 13:30 – 15:00 Closing remarks and prize giving

**Martin Krupička**  
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CA18112 Training school coordinator