EUROPEAN COLLOID AND INTERFACE SOCIETY

Newsletter 6

July-August 2023

In this issue:

Message from the Editor

Dear colleagues, ECIS members

In the present issue of the ECIS newsletter we are very happy and honoured to present this year's recipients of the two major awards that ECIS bestows every year. Prof. Bernard Binks from the University of Hull is the Overbeek medal winner, following a tradition of great scientists who have received the medal. And Prof. Regine von Klitzing from the Technical University of Darmstadt is the recipient of the Solvay award. The two prize winners are important scientists, who have left their mark in Colloid and Interface Science.

We have chosen to present both our 2023 winners using the nomination letters provided to the corresponding committees. Nomination letters are an important part of a nomination process and we strongly encourage our members, both to suggest excellent scientists for next year's awards and to spend time to provide great nomination letters.

Message from the editor

Last May was particularly important for ECIS as the first ever ECIS webinar on fundamentals finally took place. Professors Barry Ninham and Vincent Craig, both from the Australian National University, discussed the current great fundamental challenges of Colloid and Interface Science, with special focus on nanobubbles. We are thankful to the ECIS Vice-President, Professor Tommy Nylander, and the excellent staff at LINXS (Sweden's synchrotron run by Lund University) for becoming most efficient hosts for the webinar. Between 120 and 150 scientists followed the webinar during its 2,5 hour span. This successful event points the way for the future of ECIS. The Board is now discussing the frequencies and topics of the following ECIS webinars, hoping to provide to our community a new dimension for learning and scientific discussion.

Besides all these exciting developments we must not forget the two most important ECIS events for 2023. ICS Marcoule will host a new type of Student Training School at the end of August, with lectures and hands-on training in the lab. And the Naples organizers are waiting to welcome European Colloid and Interfacial Science researchers in a most exciting conference that will take place in the week 3-8/9. See you all in Naples!

On behalf of the ECIS Board

E. Leontidis

(Editor of the ECIS newsletter)

Prof. Bernard Binks is awarded the Overbeek medal for 2023

The Overbeek medal is the highest honor that ECIS can bestow on an individual for a lifetime of commitment and achievements in Colloid and Interface Science. The medal is awarded to exceptional scientists in the field. A look at the list of laureates of the last 15 years reveals that all have made their mark in the Science of Colloids and Interfaces, to the point that their names and work are points of reference for this community. This year's laureate is no exception. The Overbeek committee, consisting of a representative of the Overbeek foundation, the past President, current President and vice-President of ECIS and the three previous winners has selected Prof. Bernard Binks as the Overbeek medalist for 2023. We include here the nomination letter submitted to the Overbeek committee, which accurately describes Prof. Binks's achievements:

The scientific achievements of Bernard P. Binks are outstanding; he is one of the best-known members of the Colloid and Interface Science community. His first work with microemulsions revealed his research style: to address complex problems and find remarkably clear solutions, paving the way for future work. He is successful in areas, where many others spent years of investigations in vain. His fundamental research soon attracted industrial interest, prompting him to patent several discoveries, which subsequently led to efficient industrial processes.

Binks is best known for his Pickering (particle-stabilized) emulsion work, that he started at the end of the 90's. At that time, the field, despite being old, was rather unexplored. He decided to commence systematic studies on well-defined systems in order to establish the basic rules governing the replacement of surfactants (then currently used to stabilize emulsions) by particles. He completely renewed the field, using his deep knowledge on surfactants and a wise choice of stabilizing particles. His early work established the conditions necessary to stabilize oil+water emulsions with particles alone. He showed the importance of particle wettability on both emulsion type and stability, and suggested the link with the energy of detachment of a single particle from the interface. He put forward the two main and accepted mechanisms of emulsion stabilization by particles: bilayer formation or bridging monolayer formation, dependent on particle wettability.

Prof. Bernard Binks is awarded the Overbeek medal for 2023

Binks demonstrated how emulsion inversion could be achieved by simple variation of the oil/water ratio, which is impossible using surfactants. He developed a theory for the contact angle of a particle at an interface, that he applied in studies on emulsions of perfume oils and water; this has been extensively used since in predicting emulsion type. He also clarified the phenomenon of limited coalescence in Pickering emulsions. Other notable work included an interferometric method for determining the particle contact angle directly and studies on clay, microgel, starch and natural spore particles, stimuli-responsive particles, stable multiple emulsions, bicontinuous jammed emulsion gels. Recently, he has established the conditions necessary to stabilize emulsions of immiscible oils and has begun work on water/water emulsions.

Binks extended his emulsion work to particle-stabilized foams, rapidly attracting interest by researchers involved with minerals flotation. These foams also act as precursors of porous solid foams, of current interest in car industry as shock absorbers/bumpers. He set forth conditions where particles halt both disproportionation and coalescence instabilities, which prevail with surfactant foams. He showed for the first time the phase inversion of an air-in-water foam to a water-in-air powder, something not achievable with surfactants. Dry water has great interest for food and cosmetics companies, as water can be delivered on demand by gentle shearing. Combining Pickering emulsions with dry water technology enabled Binks to produce stable powdered emulsions, in which oil (water) drops are dispersed in water (oil) themselves dispersed in air. Dry water was commercialized in 2009 by Shiseido as a cosmetic (Benefiance Luminizing Powder-C Essence). Since his pioneering studies, interest has grown enormously and a number of companies are now exploiting the technology.

Binks extended his work to functionalizing particles in situ by addition of suitable surfactants; such systems are now included in many commercial formulations. Recently, he used a novel surfactant whose behavior can be switched between being surface-active or surface-inactive using CO_2 or N_2 gas. Such switching can be transferred to silica particles stabilizing emulsions. He thereby prepares unique switchable emulsions, that are readily stabilized or destabilized by the use of a simple trigger. This idea has also been extended to switchable foams with success.

Binks also investigated air-in-oil foams stabilized by fluorinated particles. He succeeded in making powdered oil with plate-like particles. The process is significantly easier than the existing method using emulsions and removing the water. Dry oil powders, have great potential as slow release vehicles in food and cosmetics preparations. He described a new protocol for the formation of ultra-stable oil foams by crystallization in situ of oil -soluble surfactants. Breaking of the foam is achieved by heating. The work was extended to the whipping of vegetable oils, and Nestlé is pursuing development of this concept in aerated confectionery products.

Binks has recently opened up the possibility of using Pickering emulsions and foams as vehicles for catalytic reactions in which the stabilizing particles may themselves be the catalyst. In biocatalysis for example, novel alginate particles were designed within which lipase enzyme was immobilized. The catalytic efficiency was far greater than in unstirred biphasic mixtures and the catalyst could be recycled easily without significant loss of activity. Work in this area has also included the synthesis of new particle types like titanosilicate and replacement of conventional oils by environmentally benign ionic liquids.

So far, Binks has published 339 Journal Articles, 10 Review Articles, 9 Book Chapters, 6 Conference Proceedings, 17 Patents and edited 3 Books. His h-index (WOS) is 84. He gave 223 major lectures (plenary, keynote and invited) in conferences. He is constantly invited to be part of scientific committees of international conferences, including the ECIS conferences. He also chaired or organized various other conferences. His research led to a number of awards, including the 2014 RSC Faraday Division Surfaces and Interfaces Award and the 2016 ACS Langmuir Lecturer Award. In 2017, he was invited to write a Feature Article on the Pickering emulsion field for Langmuir, which was chosen for the front cover. He was an awardee of the "100 Talent Program" from Shanxi Province in 2020 lasting 5 years for his ongoing collaborations with Chinese academics. In a recent study by Ioannidis et al., PLoS Biol., 17, e3000384 (2019), Binks is ranked within the top 0.01% of scientists, based on impact.

In summary, the research activity of Bernard P. Binks is remarkable in all aspects. His leadership and scientific excellence in the field of colloid and interface science is clear, and he fully deserves the Overbeek medal for 2023.

Prof. Regine von Klitzing is awarded the Solvay prize for 2023

The Solvay prize committee, consisting of a representative of Solvay, the past President, current President and vice-President of ECIS and the three previous winners has selected Prof. Regine von Klitzing for the 2023 Solvay prize. A long-time member of the ECIS community, she has spent much of her scientific life until now at the Technical University of Berlin, and is now a Professor of Physics at the Technical University of Darmstadt. Please read the nomination text submitted to the committee.

We nominate Prof. von Klitzing in recognition of her recent breakthrough studies on foams stabilized with soft particles. Foams stabilized by soft polymer particles are of interest for many applications in food technology or for catalysis. Proteins play an important role as foam stabilizers, but their stabilizing mechanism depends very much on the specific class of proteins, and it is difficult to get insights into unifying concepts due to the existing large protein variety. Therefore, better controlled model systems are needed. A suitable model system for soft and deformable particles are colloidal microgels. Among them, (thermosensitive) poly(N-isopropylacrylamide) (PNIPAM) microgels serve as the gold standard for this class of materials. PNIPAM microgels adsorb spontaneously and irreversibly at the oil/water interface, which makes them good emulsion stabilizers. Although PNIPAM microgels adsorb also efficiently at the air/water interface, much less is known about their performance as foam stabilizers. To understand and control the foamability and foam stabili-zation by PNIPAM microgels the group of Regine v. Klitzing started recently to explore microgel–stabilized foams at different length scales, through studies on macroscopic foams, foam bubbles, single microscopic foam films, the adsorption of foam stabilizers at the planar liquid/air interface, and the structural and mechanical properties of the foam stabilizers (e.g., microgels) themselves. Among other studies we would like to address the publication: M. Kühnhammer, K. Gräff, E. Loran, O. Soltwedel, O. Löhmann, H. Frielinghaus, R. von Klitzing "Structure formation of PNIPAM microgels in foams and foam films" Soft Matter, 2022, 18, 9249. DOI: 10.1039/D2SM01021F, as the center piece giving new insights in the field and presenting a seed for new development in the field of foams stabilized by soft particles.

Prof. Regine von Klitzing is awarded the Solvay prize for 2023

What distinguishes Regine von Klitzing's work is the combination of

a) the use of many different techniques (small angle neutron scattering (SANS), dynamic light scattering (DLS), indentation by atomic force microscopy (AFM), thin film pressure balance (TFPB)),

b) the development and enrichment of techniques (temperature-controlled foam column for height sensitive SANS measurements, optical extension of TFPB for disjoining pressure isotherms of heterogeneous films) and

c) the combination of experiment and modelling (modelling of SANS and TFPB data).

The uniqueness of the central study described here is to relate the structural and mechanical properties of foam stabilizers (i.e., microgels) and their stabilizing performance of foam films to the foam properties.

The main approaches and outcomes are described below in more detail:

Since thermosensitive PNIPAM microgels are used in these studies, the foams are thermoresponsive as well: They are stable at temperatures below the so-called volume phase transition temperature (VPTT), and rapidly collapse when heated above the VPTT. Therefore, the study focuses on a temperature regime well below the VPTT, where microgels are swollen and the foams stable.

The structure of the foam was analyzed by SANS in a temperature-controlled home-built foam cell designed and constructed by the Klitzing group (Kühnhammer et al. "Flexible Sample Environments for the Investigation of Soft Matter at the European Spallation Source: Part III—The Macroscopic Foam Cell." Applied Sciences 2021, 11, 5116. DOI: 10.3390/app11115116). This cell allows SANS measurements at different foam height. The SANS curves were analyzed using a self-written program considering an incoherent superposition of reflectivity curves of a set of normal distributed film thickness and a Porod distribution. The model was adapted from a model recently published by the Klitzing group (Kühnhammer et al. "A new model to describe small-angle neutron scattering from foams" Journal of Applied Crystallography 2022, 55, 758, DOI 10.1107/S1600576722004691) to describe surfactant stabilized foams. This model allowed the complete description of SANS curves of foams. The data show a clear Porod behavior ($I \propto q^{-4}$) over a large q-range, which is attributed to plateau borders, nodes, and the thicker parts of the foam films.

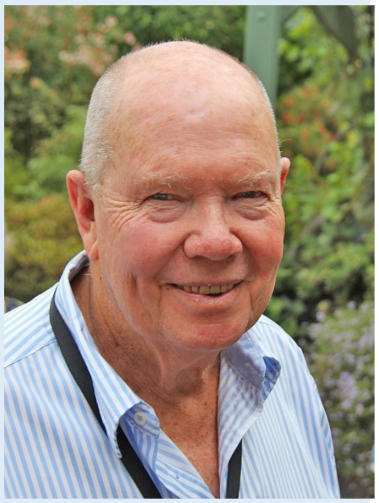
Prof. Regine von Klitzing is awarded the Solvay prize for 2023

The SANS reflectivity contribution suggests that the foam films have a thickness of about 25 nm, which is far less than the diameter of the microgels (700–800 nm). This raised the question, how the small values of the thickness of the foam films can be explained. Therefore, single horizontal foam films were studied in a TFPB (adaption of the porous plate technique of D. Exerowa). The adaptation of the Klitzing group allows the analysis of films thicker than 100 nm. Disjoining pressure isotherms can be recorded by suitable tracking methods even from heterogeneous foam films or from moving domains in the foam films (https://download.hrz.tu-darmstadt.de/media/FB05/SMaI/V0011_Microgel_Foam_Films_KG_v2.mp4). The TFPB measurements show heterogeneous foam films with thinner areas (about 25–35 nm thick) interspersed in a network structure with a thickness of several hundreds nm. The thinner areas are related to the reflection part of the SANS curve of the macroscopic foam. The network structure is a network of the microgels, which stabilizes the foam film in a corset-like structure. An increase in foam stability is observed for increasing amount of cross-linker, which is explained by the increasing thickness and elastic modulus of the microgel network in the foam films. In addition, microgel aggregates might be formed inside the foam leading to subsequent drainage blocking of and further stabilization of the macroscopic foam.

These findings open the way for future research, which will show whether other soft particles show similar pattern formation when confined in foam films. Moreover, microgels are thermosensitive, which makes them promising candidates for tailoring stimuli responsive foams which can be destroyed on demand by changes in temperature.

In our view, this body of work makes Prof. von Klitzing a more than worthy candidate for the 2023 ECIS Solvay Prize.

The first ECIS webinar on the fundamentals of Colloid Science, 5/5/2023



The first ever ECIS webinar was held on 5/5/2023 and proved to be a resounding success. It took considerable effort by the ECIS Board (especially Minos Leontidis, Pierandrea Lo Nostro, and Tommy Nylander) and the excellent staff at LINXS (the Swedish synchrotron who were the hosts of the event), most notably Josefin Martell and Anna Ntinidou. And of our two distinguished speakers and eminent colloid physical chemists, Prof. Barry Ninham and Prof. Vincent Craig, both from the Australian National University, who were the "stars" of the meeting.

After a short introduction by the ECIS President, Prof. Barry Ninham gave a presentation entitled "Challenges to Colloid Science". Barry was clearly the ideal person to launch this webinar series, since he has always challenged fundamental beliefs and worked on fundamental issues. In recent years, Barry has focused on the impact that Colloid Physical Chemistry should have on Biology. This was in fact the main point in his presentation. He focused on the effect of nanobubbles on a variety of systems of interest in Physical Chemistry, Colloid Science, Biology and Physiology. It became clear that if his ideas about the structure and function of the glycocalyx are correct, then we may expect a revolution in medicine, with Colloid and Interface Science at its center.

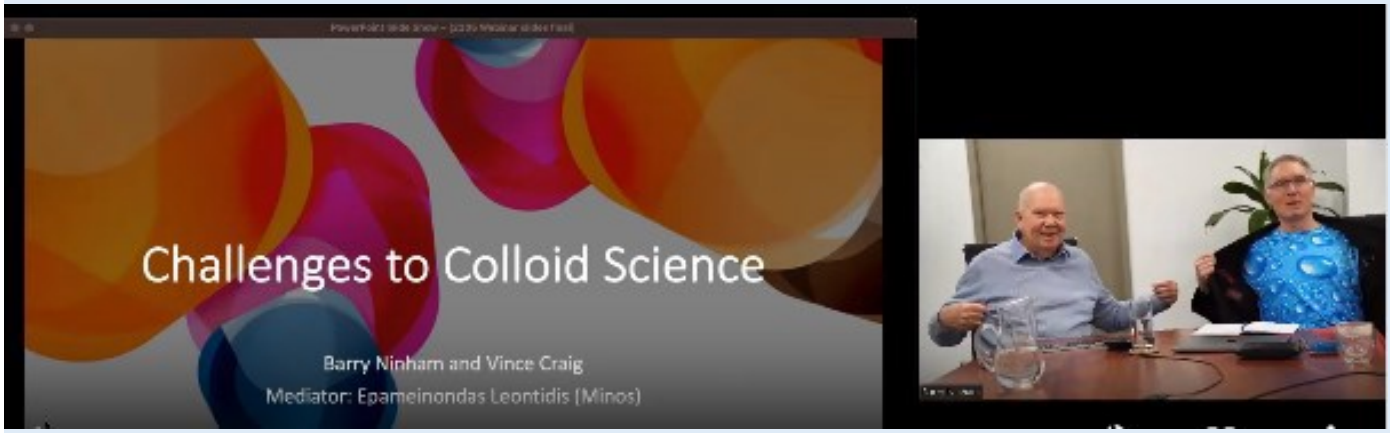
After Barry's presentation, which lasted roughly 50 minutes, Vince Craig took the stage for 35-40 minutes and explained the nature and properties of nanobubbles, and his insights about the lives and lifetimes of nanobubbles with respect to their sizes. Vince showed that several phenomena reported in the literature and ascribed to nanobubbles are in fact experimental artefacts, involving contamination by nanoparticles.

Vince and Barry then took questions from the audience, some asked in advance and some in real time. The lively discussion went on for about 30 minutes.

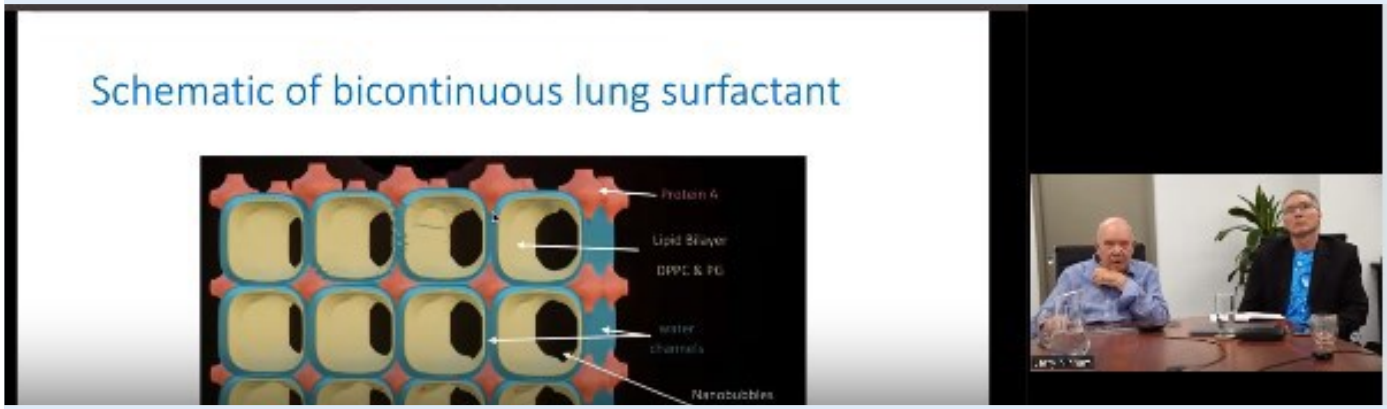
The first ECIS webinar on the fundamentals of Colloid Science, 5/5/2023

The video recording of the first ECIS webinar is available for our members in the ECIS website at **https://www.ecis-web.eu/conferences/ecis-webinars-on-fundamentals/**

As a preview, we add here some frames from the recording. You can see first a frame from the very beginning of the event, highlighting the degree of preparation of our two speakers. Vince went to the point of wearing a T-shirt full of bubbles!



From the wonderful presentation of Barry here is a frame showing the bicontinuous structure of the lung surfactant.



The first ECIS webinar on the fundamentals of Colloid Science, 5/5/2023

From Vince's presentation we show here just the opening slide.

The overall participation peaked to about 150 participants, although close to 200 had originally pre-registered. One of the major problems that we faced was the timing of the webinar. Given the very large time difference between Europe and Australia, the event had to start at 12:00 CET, which was already 20:00 Canberra time. We hope that this difficult time did not deter many of our friends and colleagues from attending the webinar. Given the large time difference, the large number of attendees and the shortness of time, there could not be a true discussion with the audience participating as much as we would like. Still, there were several questions that the speakers had to answer, as shown in our last frame:

Overall, the ECIS Board feels that the first ever ECIS webinar was a significant success. The Board is now discussing the frequency and future topics of this exciting new meeting that current technology allows us to design, connecting scientists all over the World.

37th ECIS conference, Naples, Italy, 3-8/9/2023

In 2023 the yearly ECIS conference will be organized in Naples, Italy. Following on the footsteps of the successful organization of the Chania-Platanias conference, we are looking forward to one more excellent ECIS conference. Professors Luigi Paduano and Gerardino d' Errico will chair the organizing committee in Naples, and they asked us to convey their warmest invitation to all members of the European community of Colloids and Interfaces to this important event. See you all in Naples! A strong organization effort is underway to make this an unforgettable experience for all.

37th ECIS conference, Naples, Italy, 3-8/9/2023

ECIS

ECIS

37th ECIS conference
3-8 September 2023
NAPLES

IMPORTANT DATES:

- Abstract Submission deadline: **31 March 2023**
- Early registration: **10 June 2023**
- Mid Registration: **15 July 2023**
- Late Registration: **31 August 2023**

Conference Organizers

Università degli Studi di Napoli Federico II · CSGI · ECIS

Welcome Note

Dear colleagues,

it is our great pleasure to invite you to the *37th Conference of the European Colloid and Interface Society (ECIS 2023)* that will take place from *3rd to 8th September 2023 in Naples (Italy).*

ECIS 2023 is organized by the *University of Naples Federico II* and *CSGI*, under the auspices of *ECIS*, bringing together participants working in the interdisciplinary field of colloid and interface science, with a broad background ranging from chemistry to physics, from biology to engineering.

The scientific program will include plenary and keynote invited lectures, oral presentations and posters, consisting of four parallel sessions.

The venue is the Stazione Marittima, located close to the Maschio Angioino Castle and the very heart of the historical centre of Naples.

Complementing the scientific program, a diverse social program will offer to participant the the possibility to discover the beauties and the historical and cultural gems spread in and around the city of Naples.

We look forward to your venue in Naples
The organizing committee

Conference Venue

The Maritime Station offers modern and functional structures among the most significant in Naples, its spaces have been the subject of restoration and reorganization, respecting the original architectural lines, thus giving rise to the Congress Center and the shopping gallery. The Congress Center which stands on the head overlooking Piazza Municipio, with its total area of 3,300 m2 is the ideal location for organizing congresses, events and exhibitions. In its 18 multipurpose meeting rooms it can accommodate from min. 20 to max 1,800 seats.

ECIS

ECIS

37th ECIS conference
3-8 September 2023
NAPLES

Conference Sessions

- Amphiphiles and Self-assembly
- Bio-interfaces, Drug Delivery and Nanomedicine
- Colloids for Analytics
- Cultural Heritage and Environment
- Emulsions and Foams
- Energy and Photonics
- Food Science and Technology
- Nanoparticles, Nanocomposites, Nano- and Micro-Structured (Bio)Materials
- Polymers, Polyelectrolytes, Gels, Liquid Crystals and Anisotropic Fluids
- Rheology and Phase Behavior of Colloids and Complex Fluids
- Surface Forces and Thin Films
- Theory, Modelling and Simulation of Colloidal Systems
- Wetting and Capillarity

ECIS

ECIS

37th ECIS conference
3-8 September 2023
NAPLES

Plenary Speakers

Werner Kunz
Universität Regensburg

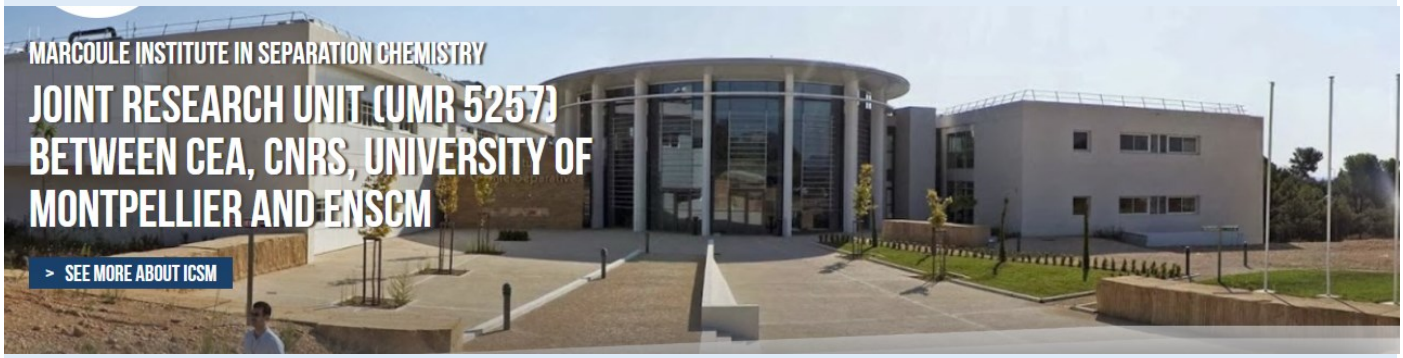
Uri Banin
The Hebrew University of Jerusalem

Molly M. Stevens
Imperial College London

Brigitte Voit
Leibniz Institute of Polymer Research Dresdenù

Paolo Samorì
University of Strasbourg

2023 Student Training School in Marcoule, France



In the place of the usual Student Training School typically organized by the yearly ECIS conference organizers, the ECIS General Assembly has approved a different event for 2023. A Student Training Camp will take place in Marcoule, France, during the week prior to the Naples conference (28/8 to 1/9/2023), and will use a different format:

The number of student-participants will be smaller than that in previous ECIS Summer Schools (a maximum of 30). The students will be associated in pairs, and will follow each morning 2 specific courses of 1,5 hours each. Professors Dganit Danino (Technion, Haifa), Dominik Horinek (Univ. of Regensburg), Martin Inn (Univ. of Montpellier), and Minos Leontidis (Univ. of Cyprus) will deliver the morning courses. The afternoons will be dedicated to work by the student teams on either a physicochemical phenomenon to be chosen from the list of the conference themes (e.g. solubilization, dispersion, coagulation, adsorption/separation, gelation, colloidal stabilization, wetting, phase transitions ....) or an innovation project. The projects will be chosen from available lists before the School starts (just after the registration).

Most student teams will be asked to perform specific experiments, using one or more of the colloid chemistry methods available at the Marcoule Institute. The results of the student efforts will be presented on the 5th day in the form of 15-minute slide shows or video presentations. The student teams will be supervised and supported (to guide, to answer questions, to direct literature research if necessary) by the professors and other supervising researchers from ICSM.

We are very excited about this new format, which starts this year on a trial basis. Details are given in the website of the Training School, which is given in the next page provided by the organizers. (**https://site.evenium.net/y4mccjx5/registration**)

2023 Student Training School in Marcoule, France

Final notes

- You receive this newsletter as a registered member of ECIS
- If you are not an ECIS member, please contact our Secretary, Prof. Pierandrea Lo Nostro (pierandrea.lonostro@unifi.it)
- If you have comments or suggestions and if you wish to contribute to future newsletters, please contact the newsletter editor, Prof. Minos Leontidis (psleon@ucy.ac.cy), or the ECIS webmaster, Prof. Dominik Horinek (dominik.horinek@ur.de)