

DoDyNet - Workpackage 1 – Deliverable 1.22 Number 103 :

Management Report – Year 1

1. General progress of the action

Scientific Progress. This part will focus mainly on the work of the ESR students who have been working longer on the project.

WP 1 Synthesis

Clément Coutouly (ESR1) worked on the design of ABA triblocks started as soon as the polymer composition was decided with PnBA as central block and Polystyrene as outer block. First, kinetics studies have been made to control RAFT polymerisation of Polystyrene and design several Polystyrene with different length, it means with different Molar mass. At this point, the synthesis of different Macro-RAFT agent (polystyrene) with different molar mass was controlled and duplicated.

The second part was to synthesize the central block made of PnBA. At the lab, methods to synthesize long linear PnBA have been developed. These methods have been modified to fit with our targeted molecular mass. Once ABA triblocks synthesized, some rheology tests in shear have been investigated to understand the influence of the outer blocks, and observe any phase separation which is the main target of these systems.

In parallel, functionalised ABA triblocks have been developed with the same composition but there is the introduction of terpyridine-nBA monomer along the linear chain (0.5%) to introduce metal-ligands interactions in the system while forming gels.

Currently, one more composition of (functionalized) ABA triblock have been developed and other outer blocks are considered.

Finally, specific solvents for middle bloc and which are non solvent for the outer blocks are investigated to form gels with ABA triblocks. And in the next weeks, metallo-supramolecular gels will be studied.

Rowanne Lyons (ESR 2) has worked on the preliminary steps to create polyrotaxanes which will be used in slide ring gels.

Larissa Hammer (ESR 3) has been focusing firstly on several test polymerizations with nBA that have to be conducted to determine the best polymerization conditions. This includes target molecular weight, temperature, solvent, initiator and monomer concentration. The next step is to synthesize the respective monomers and building blocks for the Networks 1 and 2. Subsequently, these building blocks have to be copolymerized with nBA. The thereby

synthesized functional thermoplastics are to be analyzed. In the next step, the cross-linking reaction is tested by cross-linking the thermoplastics individually in solution and if this works fine, the thermoplastics of Network 1 and Network 2 are cross-linked simultaneously to create a double network. These two networks have already been described extensively¹.

WP 2 Structure

Christina Pyromali (ESR5) has focused on rheology measurement techniques. More specifically, the first period of the research is devoted to acquiring a strong expertise on how to test the linear and nonlinear shear as well as the linear creep behavior of either entangled and unentangled polymeric materials. Recently, the research interest focused on the nonlinear shear behavior of entangled, metal- ligand associated polymer networks which is also building block in Double Dynamic Networks (DDNs). On this aspect, the protocols have already been developed and the rheological measurements are about to start².

WP 3 Dynamics

Wendi Wang (ESR 6) has been working on two different samples that have been selected for this project: a pure polystyrene with T_g around 100°C and a polystyrene containing 5% acid group on the polymer chains with T_g around 114°C. These acid groups tend to form hydrogen bonding at room temperature. She has done experiments on both of these and has set the ground for future work which will focus on testing the effect of hydrogen bonding in bending tests and depending on the results, so a polystyrene containing higher acid group proportion will be studied³.

This work is completed by Carole-Ann Charles (ESR 7) work on improving and characterizing a setup allowing the study of drop impact dynamic with minimized shear dissipation⁴.

WP 4 Modelling

ESR 11 et 12, just started working in September, are focusing on literature and bibliographic research and notably on elaboration of a tube model to describe the rheology of entangled polymers.

WP 5 Application properties

Simone Sbrescia (ESR 9) has done tests to assess the influence of composition on mechanical properties, in particular strain at break, first at room temperature and then at 5 different temperature (from 50 to 150 Celsius degrees) since it has been seen for thermoplastic elastomers a dramatic drop of strain at break by increasing temperature.

¹ see Yearly ESR Progress Report, WP1, D1.17 D.7, pp.6-9

² see Yearly ESR Progress Report, WP1, D1.17 D.7, pp.13-14

³ see Yearly ESR Progress Report, WP1, D1.17 D.7, pp.16-19

⁴ see Yearly ESR Progress Report, WP1, D1.17 D.7, pp.20-21

Cyclic tests were also conducted on this system to get more clues about the structural transition that happen during stretching both at room and higher temperature by varying the composition of the materials.

Different tests with different sample's shapes and methods are running to assess the best protocol to run fracture tests on these materials⁵.

Finally, ESR 13, Jianzu Ju, for his first two months of the project, has set the following objectives: learning about diffusing wave spectroscopy (DWS) technology and prepare for the experimental material/set-up. He will also investigate fracture property of TPEs material (block copolymer of poly (butylene terephthalate) and polytetrahydrofuran (PBT/PTHF)) from DSM.

Samples

Samples have started circulating between members of the network. Two triblocs ABA (used in 1A and 1D systems) were sent from UCL to FORTH. tesa has also sent specific samples for the ESRs in FORTH to work on. Carole-Ann Charles from Université de Montpellier has been working on the samples of her university which are connected microemulsions.

Training

During this first year, we organized the Elementary Modules I. We chose to change the initial dates when this Elementary Modules were planned (initially late July) so that all the ESR would be recruited and could then participate to the Elementary Modules. Organizing them in September allowed us to organized only one set of Elementary Modules and thus enabled us to organize more Advanced Modules at a later stage as all the ESR were able to follow the Elementary Module at the beginning of the project.

During these Elementary Modules, the following courses were given. The full programme can be found in the Appendix 1.

- Introduction to Polymer Synthesis (*Renaud Nicolaÿ, ESPCI*)
- Introduction to supramolecular polymers (*Charles-André Fustin, UCLouvain*)
- Basic Polymer Science (*Daniel Read, ULeeds*)
- Curing chemistry of organic coating systems (*Patrice Roose, Allnex*)
- Introduction to scattering theory (*Daniel Read, ULeeds*)
- Introduction to Scattering Techniques (*Benoit Loppinet, FORTH*)
- Basic molecular rheology (linear regime) (*Dimitris Vlassopoulos FORTH*)
- High shear (*Dimitris Vlassopoulos FORTH*)
- Introduction to extensional rheology (*Qian Huang, DTU*)
- Double Dynamic Networks: a review (*Evelyn van Ruymbeke, UCLouvain*)

⁵ see Yearly ESR Progress Report, WP1, D1.17 D.7, pp.25-26

- Basic principles of coarse-grained molecular simulations (*Giovanni Ianniruberto, UN*)
- Microscopic dynamics and rheology of soft gels: computational approaches and connection to experiments (*Emanuela Del Gado, Georgetown University*)

Following this event, a training evaluation was made. The questionnaire submitted to students and the results following this assessment can be found in the Deliverable “Training Report M14 WP7 D.7.9 N23”.

Deliverables

You will find here the table resuming our deliverables and the date when they were issued. The main differences in the dates initially planned at the beginning of the project and the actual time when the deliverables were issued can be seen in two deliverables.

Firstly, for the Minutes of the Kick-off meeting, this was due to a computer problem which made us lose all the notes made during the Kick-off meeting. It made it difficult for us to issue a complete resume of this meeting in due time.

Secondly, as explained above, the Elementary Modules were organized in September 2018 instead of July 2018 to enable all the ESR to be present at the first meeting and following these Elementary Modules. As we knew we were doing good progress in the selection process and that we would be in advance in the recruitment timetable, we thought it made more sense to wait one month for all our ESR to have started on the project and organize the Elementary Modules for all of them in one event.

This also implies that all our next meetings will be slightly delayed due to this strategical decision. Thus, the Advanced Modules I and the first Industrial Workshop will take place at the end of January 2019 instead of late November 2018.

Table of Deliverables achieved to date

WP1	D1.9	D2	Minutes Kick-off Meeting	UCL	24 May 2018
WP1	D1.21	D102	Minutes of Supervisory Board	UCL	8 February 2018
WP1	D1.20	D100	Consortium Agreement	UCL	20 February 2018
WP 1	D1.1	D3	IPR Protocol	UCL	13 February 2018
WP 9	D9.1	D36	Website	CNRS	8 February 2018
WP 1	D1.2	D5	Recruitment of ESR round 1	UCL	3 May 2018
WP 1	D1.10	D4	Minutes of Supervisory board	UCL	3 May 2018
WP 1	D1.23	D101	Data management plan	UCL	24 April 2018
WP 1	D1.8	D6	Recruitment of ESR round 2	UCL	27 July 2018
WP 7	D7.1	D21	Elementary Module I	UN	9 October 2018
WP 1	D1.4	D9	Recruitment of ESR Final round	UCL	2 October 2018
WP 1	D1.11	D8	Minutes of Supervisory board	UCL	13 November 2018
WP 1	D1.17	D7	Yearly ESR Progress report	UCL	6 November 2018
WP 10	D10.1	D1	EPQ Requirement n°1	UCL	8 November 2018

Milestones

The following Milestones have been submitted so far. The Milestones related to first scientific results have been delayed as the ESR student working on these samples was only recruited in March 2018. This means the Milestones in red in the table below (4 and 6) will be available really shortly.

The Project check was initially planned during our next project meeting in January 2019 (Month 14) but due to an agenda issue, our Project Officer will carry out this Mid-Term Check during the project meeting that will take place in May 2019. The programme, dates and venue of this Mid-Term Check have already been determined. It will take place in DTU, Denmark on the 6th and 7th of May 2019. The full programme can be found in Appendix 2.

Table of Milestones achieved to date

1	Kick-off meeting	UCL	30 Nov 2017
2	Recruitment end	UCL	15 Sept 2018
3	Researcher Declarations on Conformity	UCL	9 Oct 2018
4	Sharing DD thermoplastic elastomers (DD-TPE) and adhesive among the consortium	DSM Ahead	01 Jul 2018
5	Synthesis of systems 1.A. and distribution among the partners	UCL	Nov 2018
6	Synthesis of systems 1.C. and distribution among the partners	UCL	01 Oct 2018
7	Synthesis of the first systems 1.B. and 1.D., and distribution among the partners	UCL	1.D Nov 2018
20	Webpage online, advertised open positions	UCL	19 Dec 2017
22	Planned recruitment completed	UCL	02 Oct 2018
23	All recruited fellows enrolled in PhD programme	UCL	Nov 2018
24	Project check at month 13	UCL	Planned 6 - 7 May 2019

Colour explanation:

In red – Milestones related to samples that will be available shortly.

In orange – Date changed, not the same as initially planned.

2. Recruitment strategy

Here we will detail the selection process of the ESR candidates for the DoDyNet project.

The job offers were drafted by the leading scientists and collected by the coordinator, Evelyne van Ruymbeke. Each Early Stage Researches (ESR) positions were described in detail taking into account the specificities of the research area covered by each PhD candidate, the timing and duration of the positions, their location and their supervisors. A description of the entire DoDyNet project was also included. The full ESR descriptions and vacations can be found as they were published in Appendix 3.

The finalized descriptions of these ESR positions were published on different websites to maximize the visibility of these job opportunities (mainly SoftComp, Euraxess and European Society of Rheology).

They were published on Euraxess at different time intervals. They were first online on Euraxess on the 22nd of October 2017. The deadline to submit applications was 30th of November 2017.

They were then published a second time on the 14th of December 2017. The deadline fixed was the 31st of January 2018.

The third announcement for these positions was done on the 13th of February 2018 and the deadline was the 30th of March 2018.

The last few vacant job positions were then published with a deadline fixed on the 30th of June 2018.

As soon as the website of the project was online in December 2017, the different offers were also published on the following link : <https://www.dodynet.eu/>.

The vacant positions were also published on several websites, specialized on the topics studied in DoDyNet. Thus, the job offers were published on the SoftComp website (<https://eu-softcomp.net/>) and the website of the European Society of Rheology.

All the applications were sent to the project manager by mail to the same email address: dodynet-manager@uclouvain.be. The application were then transferred to the different professors in charge of each specific ESR position. The selection between the candidates was then made by this selection committee of the university and, when relevant, with the assistance of the project coordinator, Evelyne van Ruymbeke.

Following these publications, a total of 197 applications were received.

Regarding the gender distribution, 78% are male (153 male applications) and 22% came from female applicants (44 female applications).

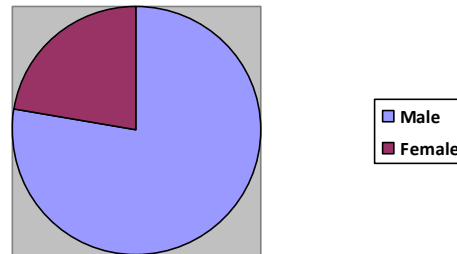


Figure 1 Gender distriburion in applications

We can say that candidates were not centralized in a part of the globe. Applications came from various countries. The country of candidates that stands out is India with a total of 57 applications, thus 29% of the total letters received. Followed by Iran with 28 candidates then by China with 19 applications.

The application distribution went like followed:

1 Application : Mexico, Marocco, Sri Lanka, Indonesia, Tunisia, Soudi Arabia, Lebano, Cameroun, Brasil, Trinité and Tobago, Portugal, Finland

2 Applications: Belgium, United Kindgom, Poland, Iceland, Denmark, Sweden

3 Applications: Russia, Malaysia, Egypt

4 Applications: Bangladesh, Greece, France

5 Applications: Germany, Spain

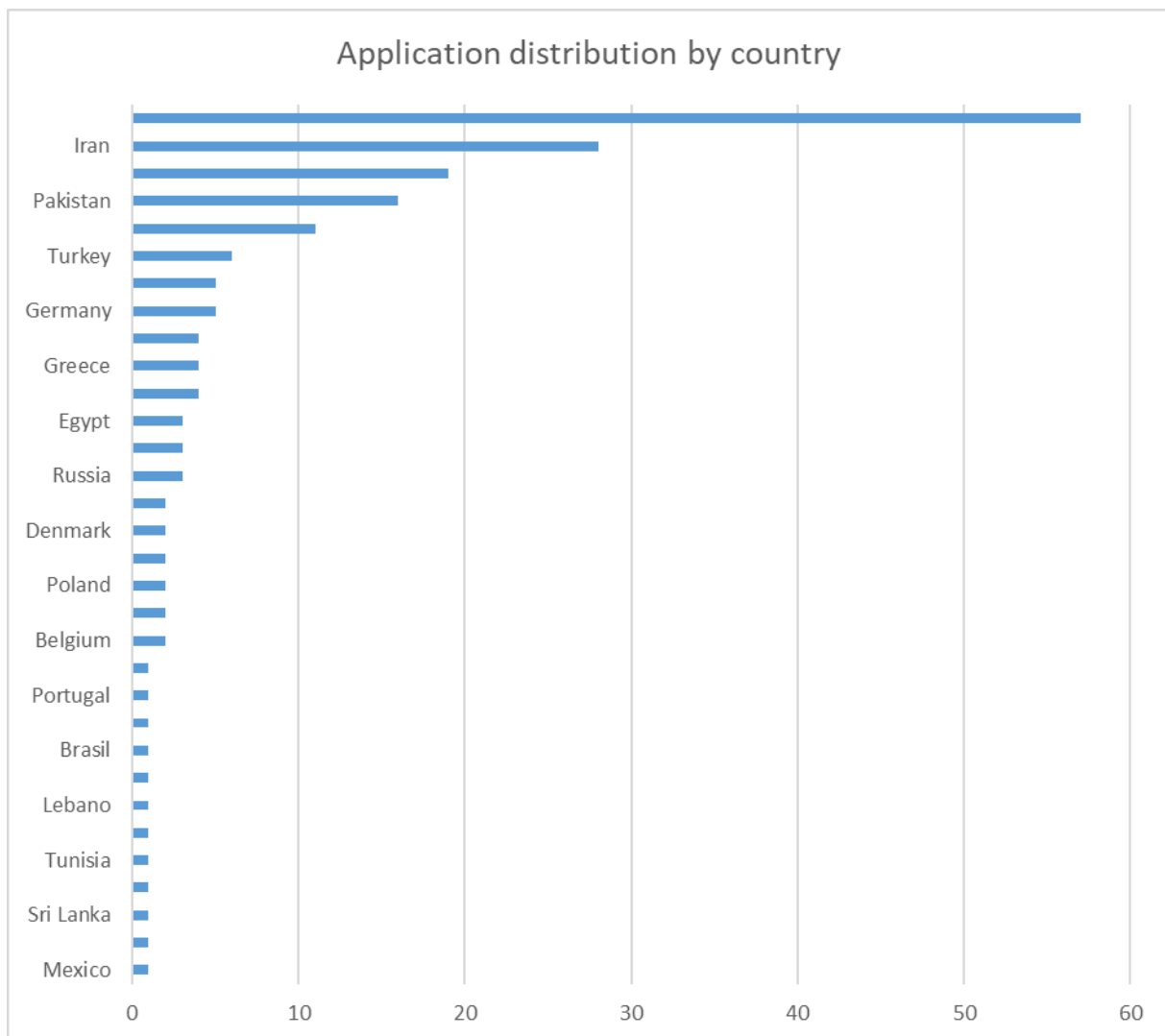
6 Applications: Turkey

11 Applications: Italy

16 Applications: Pakistan



Figure 2 Worldwide application distribution



Following a selection made by the supervisors in charge of each ESR, the 13 candidates below were selected.

ESR	Recruiting Participant	Joint supervision	Starting Month
ESR1 Clément Coutouly France	C.A. Fustin (UCL)	D. Vlassopoulos (FORTH)	March 2018
ESR2 Rowanne Lyons Trinité et Tobago	C.A. Fustin (UCL)	Q. Huang, O. Hassager (DTU)	September 2018
ESR3 Larissa Hammer Germnay	R. Nicolaÿ (ESPCI)	E. van Ruymbeke (UCL)	June 2018
ESR4 Stefania Traettino Italy	M. Cloitre (ESPCI)	S. Seiffert (UM)	September 2018
ESR5 Christina Pyromali Greece	D. Vlassopoulos (FORTH)	S. Seiffert (UM)	April 2018
ESR6 Wendi Wang China	Q. Huang (DTU)	G. Ianniruberto (UN)	June 2018
ESR7 Carole-Ann Charles Belgium	C. Ligoure (CNRS)	D. Vlassopoulos (FORTH)	January 2018
ESR8 Consiglia Carillo Italy	D. Vlassopoulos (FORTH)	C. Creton (ESPCI)	September 2018
ESR9 Simone Sbrescia Italy	P. Steeman (DSM)	E. van Ruymbeke (UCL)	May 2018
ESR10 Paola Nicoletta Italy	S. Seiffert (UM)	C. Fustin (UCL)	September 2018
ESR11 Hongwei Liu China	G. Ianniruberto (UN)	O. Hassager (DTU)	September 2018
ESR12 Yanzhao Li China	E. van Ruymbeke (UCL)	S. Seiffert	September 2018
ESR13 Jianzhu Ju China	C. Creton (ESPCI)	C. Ligoure (CNRS)	September 2018

We encountered no problem in the recruitment of the candidates. ESR candidates are mainly European (strong contingency from Italy) and Chinese. We had no problem in the process to issue the visas for these students.

3. Career development plan for each recruited researcher

Each researcher received a Career Development Plan to complete during the first few weeks they started working on the project. The template of the PCDP submitted to the ESR can be found in Appendix 4. All PCDP's were collected by the project manager, they were then read and assessed by the Executive Committee members. The ESR will have to complete the form once again at the end of next year. They will be evaluated once more at the next submission period, that is to say at the end of October 2019.

4. Management of action

The management structure has been organized as proposed in the initial project plan. There is a Governing Board which takes the decisions, an executive board which makes sure that all actions planned are taking place and an advisory board, which brings an external point of view to the network. Information on the members of the different board, work packages leaders and advisory board are detailed in Appendix 5.

A consortium Agreement was drawn up and signed by all Partners. The discussions during the Kick-off meeting between different partners was a pivotal point in the decisions settled in this Consortium Agreement. The full Consortium Agreement is available in the following deliverable : WP 1 D1.20 N100.

The Kick-off meeting was a very good occasion to get members to get to know each other, especially new academics to the network. It was also an excellent opportunity for industrial members to get to know the scientific team and vice versa as they are set to play a tandem role in this project.

Each meeting is followed by a Governing Board meeting which includes academics from every institution and industrial members.

The researchers are also involved in this Governing Board. Indeed, it was asked that the ESR students selected two Responsible Fellows to represent them in the Governing Board meetings. Larissa Hammer (ESPCI) and Paola Nicoletta (UMainz) accepted to be the first two Responsible Fellows.

The first full Governing Board took place during the meeting in FORTH in September. The detailed minutes of this Governing Board meeting in Appendix 5. This meeting insured that all topics are covered and questions and issues can be talked off freely and questions

answered collectively. Topics discussed vary around the following themes: the following meetings' agenda and organization planning, Industrial workshop setting and programme, assessment of training given, visiting experts to invite for lectures and in the network, budget measures and rules, gender equality issues.

A Data Management Plan was issued in March this year (see Deliverable WP1 D.1.23 N100). As stated already, DoDyNet will have no ethical problems related to it. The only ethical aspects that could appear in this project would be related to experience protocols but these concern experiences and not the data that will be made available for consultation and re-use.

Regarding risks, the subject was presented extensively in the Deliverable EPQ requirement 1 (Deliverable WP10 D.10.1 N1). For this project, it needs to be recalled that for the work undertaken, the security risks are minor. The only critical issue is the use of solvents. Thus we wanted to make sure that our ESR were taking the necessary precautionary measures. So we submitted a questionnaire to all our ESR team. The questions covered the following areas : Do you do any experimental data? If yes, do you use solvents in these experiments? Do you work with or handle any products that could be dangerous for your health and safety? If yes, which products do you handle? What are the measures you take to protect yourself? Thus what are the safety measures taken?

The full answer to these questions, can be found in the related Deliverable (WP10 D.10.1 N1).

There were no difficulties or issues concerning the implementation of the initial work plan.

5. Communication Activities

Different communication activities were undertaken during this first working period. First, we put in place our website, accessible on the following address : www.dodynet.eu.

Information on our project and on our research team can be found there.

As we are already planning our Summer School, which will take place in Capri in July next year, we also used our website to publish information on the aim of the school and its objectives. The programme, flyer are also available online. A registration form has also been created and is accessible for any external researchers interested in the topics addressed during the Summer School.

We also created a flyer to advertise our Summer School, topic and confirmed invited speakers. A version of the flyer can be found in Appendix 7.

Finally, following our first project meeting in FORTH Crete, we issued a Newsletter. The content of this Newsletter was done by two of our ESR, Rowanne Lyons (UCL) and Carole-

Ann Charles (Université de Montpellier). The newsletter focused on different aspects: the presentation of our ESR team, a focus on the research already undertaken by the ESR who had already started working on the project, a feed-back on the meeting held in FORTH.

The Newsletter was sent to our network and to our visiting experts by mail. It is also available on our website, in the section "News".

You can find a version of the Newsletter in Appendix 8.

6. *Impact of the Action*

The impact of the project for this period was mainly measured by the three institutions that have had ESR for the longest period of time.

For UCL, the project has already helped to:

- Start new collaborations with colleagues from UCL on Double Dynamic Networks: working on this topic, we realized that different colleagues (in particular: J.F. Gohy, A. Jonas, K. Glinel, C. Dupont) were working on the synthesis of similar systems, without having the expertise of modelling their materials. This has allowed us to start new local collaborations, in which we measure the dynamics of their systems and try to understand and model them.
- Settle a short rheology course open to all: On the request of Simone Sbrescia, we are now organizing a short rheology course (one week) based on modelling the rheological behavior of complex polymers. This course, which is open to all, will be followed by 8 people from different institutions. The objective is to share our knowledge of modelling the dynamics of Double Dynamic Networks.

FOR ESPCI, Paris, "Being part of the DoDyNet ITN allowed us to exchange with scientists having complementary expertise to ours, and to identify potential collaborations within and outside the scientific scope of DoDyNet. The recruitment of Larissa Hammer as an ESR in the DoDyNet ITN allowed our group to start working on the synthesis of double dynamic network, a key topic for us. From the practical point of view, Larissa is already playing an important role on the daily life of our team. She is very well integrated and assume responsibilities such as chemical ordering for example."

For the University of Montpellier, the recruitment of the ESR had the following impact:

- improvement of the drops impact experimental set-up for a better visualization of the expansion of the fluid sheets
- formulation test of several transient networks tests, to identify the best samples that could exhibit transient elastocapillary effects.

- formulation tests of composites transient/permanent networks and measurements of the viscoelastic properties : giving up of this topic.
- The ESR recruited, Carol-Anne, was one of the organizers of the 2018 PhD day of the Laboratoire Charles Coulomb (an annual internal scientific meeting where the PhD students of the lab present their works, it schedules around 40 talks in November this year).

FORTH University in Greece highlighted that:

The structure of DoDyNet helped recruiting ESRs, who provide a high complementarity into our research group.

They both learn a lot but at the same time, they have skills that nicely complement those of other students in the group.

This allows them to integrate well and adjust fast, so they can be productive. To this end, DoDyNet helps a lot with its highly interdisciplinary program.

Finally, the team in DTU, Denmark put the emphasis on the fact they had “received several excellent applications during the recruitment process, and got a highly qualified ESR. The project has enhanced collaborations between different research groups in our department, since on one hand the ESR needs to learn different techniques both experimentally and theoretically, as well as internal local support; and on the other hand the other groups are interested in the ESR's project. The training workshop (which will take place at DTU later) will provide an opportunity not only for the ESRs but also for our local students to learn the frontier knowledge in the field of soft matter. It will also provide an opportunity for the DoDyNet members to know our institution better”.

Appendix 1 : Elementary Modules I Programme

Elementary Modules I

Venue : **IESL, FORTH (Seminar room 1)**

Agenda

24 September 2018

8.45 – 9.00	Welcome and Introduction (<i>Evelyne van Ruymbeke, UCLouvain</i>)
9.00 – 11.00	Introduction to Polymer Synthesis (<i>Renaud Nicolaÿ, ESPCI</i>)
11.00 – 11.30	<i>Break</i>
11.30 – 13.00	Introduction to supramolecular polymers (<i>Charles-André Fustin, UCLouvain</i>)
13.00 – 14.30	<i>Lunch</i>
14.30 – 15.15	Basic Polymer Science (<i>Daniel Read, ULeeds</i>)
15.15 – 15.40	<i>Break</i>
15.40 – 17.30	Curing chemistry of organic coating systems (<i>Patrice Roose, Allnex</i>)

25 September 2018

8.45 – 10.15	Introduction to scattering theory (<i>Daniel Read, ULeeds</i>)
10.15 – 10.30	<i>Break</i>
10.30 – 12.00	Introduction to Scattering Techniques (<i>Benoit Loppinet, FORTH</i>)
12.00 – 13.30	Basic molecular rheology (linear regime) (<i>Dimitris Vlassopoulos FORTH</i>)
13.30 – 14.30	<i>Lunch</i>
14.30 – 15.30	High shear (<i>Dimitris Vlassopoulos FORTH</i>)
15.30 – 16.00	<i>Break</i>
16.00 – 17.30	Introduction to extensional rheology (<i>Qian Huang, DTU</i>)

26 September 2018

9.00 – 10.00	Double Dynamic Networks: a review (<i>Evelyne van Ruymbeke, UCLouvain</i>)
10.00 – 11.30	Basic principles of coarse-grained molecular simulations (<i>Giovanni Ianniruberto, UN</i>)
11.30 – 12.00	<i>Break</i>
12.00 – 14.00	Microscopic dynamics and rheology of soft gels: computational approaches and connection to experiments (<i>Emanuela Del Gado, Georgetown University</i>)

Appendix 2 : Mid-Term Check programme

Monday 6th of May 2019

Location : DTU

Building : 202 Room : R1005 & R1014 (restricted sessions)

- 14.00 – 14.05 **Introduction:** Short introduction by the REA Project Officer and the Project Coordinator on the purpose of the meeting.
- 14.05 - 14.20 **Tour de table:** All scientists-in-charge should briefly present their research team and describe their role within the network. Introduction of the Partner Organisations
- 14.20 - 14.40 **REA Project officer presentation:** presentation on the monitoring of project implementation, reporting and purpose of the mid-term check
- 14.40 – 15.20 **Coordinator's report:** Presentation of the Network and the progress covering the following aspects:
- Management**
- Recruitment report;
 - Deliverables;
 - Milestones;
 - Ethical issues, if applicable;
 - Management meetings (activities of the Supervisory board, etc.);
 - Financial aspects (if necessary);
 - Critical implementation risks and mitigation actions;
 - Any proposed re-orientations of the networks' activities.
 - Document management and Open Research Data, if applicable
- 15.20– 15.45 *Coffee break*
- 15.45– 17.00 **Fellows' individual presentation:** Every fellow funded by the project will present herself/himself, his background and present his/her individual research project (foreseen research, training, secondments, etc.). Scientific results are not expected in the presentations at this stage of the project (5 min per ESR)

Monday 7th of May 2019

Location : DTU

Room : Lounge in Building 229

09.00 – 10.30 Restricted session with the fellows (*only Project Officer and all the ESR*)

Governing Board Meeting (*members of the Governing Board*)

10.30 – 10.45 Restricted session (*Meeting between the coordinator and Project Officer to discuss any issue*)

10.45 – 11.15 *Coffee break*

11.15 – 12.00 Feedback and open discussion: Feedback from the REA Project Officer on the output of the network so far, on possible training areas for future exploitation or the impact on fellows' future careers development (*all members of the network*)

Appendix 3 : ESR open positions advertisement

Marie Skłodowska-Curie Innovative Training Networks

DoDyNet: Double dynamics for design of new responsive polymer networks and gels

Polymeric gels and networks are ubiquitous in daily life (foodstuff, cosmetics) and high-added value applications (tissue engineering, adhesives, coating, drug release, portable batteries, additive manufacturing). They can be either permanent (covalently cross-linked) and resist flow, or physical (reversible) and easy to process while creeping at long times. The grand challenge is to efficiently combine and control within the same material, distinct features of these two classes of networks, such as large mechanical strength, deformability, swelling and self-healing, in order to create multiply responsive materials for new applications.

The objective of DoDyNet is to develop a research roadmap that enhances our understanding of the synergistic effects arising by combining distinct dynamic modes within a polymeric network. These '**Double Dynamics Networks**' (DDNs) are characterized by a multi-scale viscoelastic response that can be tuned via molar mass, fraction of component and dynamics of (transient or exchangeable) bonds. This will enable us to selectively tailor their macroscopic properties at molecular level. Based on this concept, the integrated research program involves (1) novel synthesis of different DDNs; (2) detailed analysis of structure; (3) rheology and dynamics; (4) modeling and simulations; and (5) mechanical properties relevant to applications. The ESRs will benefit from the close inter-connection among these complementary tasks with the goal to obtain criteria for designing and developing new industrial DDN systems and optimizing existing materials.

DoDyNet is a highly interdisciplinary and inter-sectorial project, the groups involved are world-leaders in their fields, and the tasks strategically designed to ensure strong synergies. It offers young researchers an extraordinarily diverse training platform with a deep grasp of soft matter and unique exposure to industrial environment, needed to address emerging scientific and technological challenges.

Applications should be sent by email (a single pdf file containing a detailed CV, a transcript of marks obtained during the Master, a motivation letter, and the names of two referees) to:

dodynet-manager@uclouvain.be

The applicant has to clearly indicate the number of the project(s) for which he/she is applying.

Starting dates: between November 2017 and June 2018.

Project duration: 36 Months. (48 Months for ESR1, ESR2, ESR9 and ESR12).

ESR1: Synthesis and dynamics of model double networks based on supramolecular polymer

Location: UCL, Louvain-La-Neuve, Belgium

Supervisors: C.A. Fustin (Charles-andre.fustin@uclouvain.be) and E. van Ruymbeke (evelyne.vanruymbeke@uclouvain.be)

The aim of this PhD thesis is to study double networks based exclusively on supramolecular interactions. The work will consist in synthesizing building blocks (functionalized initiator or monomers) and polymers of controlled architecture bearing functional groups at well-defined locations. The latter will be mainly done by controlled radical polymerization and polymer post-modification. Supramolecular double networks will then be prepared and their rheological properties will be investigated in detail by various techniques (shear rheology, extensional rheology...) to probe the dynamics of these systems.

For this project, a **solid background in polymer chemistry is mandatory**. Good knowledge in organic chemistry and/or supramolecular chemistry is a plus. The student will have access to the doctoral training offered at UCL and to the expertise developed in the institute on soft matter materials (see <https://uclouvain.be/en/research-institutes/imcn/bsma>)

ESR2: Synthesis and dynamics of double networks based on slide-ring gels

Location: UCL, Louvain-La-Neuve, Belgium

Supervisors: C.A. Fustin (Charles-andre.fustin@uclouvain.be) and E. van Ruymbeke (evelyne.vanruymbeke@uclouvain.be)

The aim of this PhD thesis is to study hybrid double networks based on slide-ring gels and supramolecular interactions. The work will consist in synthesizing building blocks (functionalized initiator or monomers, macrocycles,...) and polymers of controlled architecture bearing functional groups at well-defined locations. Double networks will then be prepared and their rheological properties will be investigated in detail by various techniques (shear rheology, extensional rheology, etc.) to probe the dynamics of these systems.

For this project, a **solid background in polymer chemistry and organic chemistry is mandatory**. Good knowledge in supramolecular chemistry is a plus. The student will have access to the doctoral training offered at UCL and to the expertise developed in the institute on soft matter materials (see <https://uclouvain.be/en/research-institutes/imcn/bsma>).

ESR3: Synthesis and structure of reversible covalent double dynamics networks

Location: ESPCI, Paris, France

Supervisor: R. Nicolay (renaud.nicolay@espci.fr)

The goal of this PhD project is to design and prepare double networks that will contain both reversible chemical crosslinks, *i.e.* crosslinks that can be broken and reformed on demand, and dynamic chemical crosslinks, *i.e.* crosslinks that can exchange the chemical fragments they connect without any loss of connectivity. These networks will be prepared by controlled radical polymerization and/or chemical modification. The effect of the topology of the polymers, of their functionality and of the dynamics of the reversible and dynamic crosslinks, on the rheological and mechanical properties of the gels will be investigated. In collaboration with partners of the ITN, the structure and homogeneity of the networks will be studied by scattering and microscopy techniques, and the networks will be used as model objects to model the rheological features of double dynamic networks.

The PhD candidate should possess a solid background in polymer chemistry. Acquaintance with physical-chemistry and/or physics of polymers would be a real advantage. The student will have access to the doctoral training of Paris Science et Lettres Research University and will benefit from the highly interdisciplinary environment of ESPCI Paris.

ESR4: Synthesis and properties of responsive hydrogels based on reversible covalent chemistry

Location: ESPCI, Paris, France

Supervisors: R. Nicolay (renaud.nicolay@espci.fr) and M. Cloitre (michel.cloitre@espci.fr)

The PhD student will be at ESPCI working on the synthesis and properties of highly swellable DDNs based on reversible covalent bonds, in relation with their structural information.

The applicant must have a strong background in polymer chemistry, as well as in polymer physics. The student will have access to the doctoral training of Paris Science et Lettres Research University and will benefit from the highly interdisciplinary environment of ESPCI Paris.

ESR 5: Viscoelastic response of double dynamics polymer networks under large shear deformation

Location: IESL – FORTH, Heraklion, Crete, Greece

Supervisor: Dimitris Vlassopoulos (dvllasso@iesl.forth.gr).

Systematic study of the linear and nonlinear viscoelastic response in shear of specially synthesized double dynamics polymer networks. The emphasis is to relate molecular characteristics of these networks to their macroscopic response. To this end, additional dynamic light scattering are planned, whereas collaboration with UM (e.g., fluorescence correlation spectroscopy) and UCL (e.g., modeling) is envisaged. In addition, further interactions with DTU and ESPCI are possible.

Target at end of PhD: skills toward molecular design of complex soft materials with desired properties, molecular rheology and dynamics, soft matter physics.

A solid background in thermodynamics and transport phenomena is desired. Acquaintance with rheology and/or light scattering is a plus. Hence, a degree in chemical engineering or physics or materials science seems appropriate albeit not mandatory.

FORTH offers a highly interdisciplinary, stimulating environment with many visitors and exchange scientists, and a cost-effective life in beautiful Crete.

ESR6: Viscoelastic Response of Double Dynamics Polymer Networks under Transient Elongation

Location: The Danish Polymer Centre, DTU, Copenhagen, Denmark

Supervisors: Dr. Qian Huang (qh@kt.dtu.dk), Prof. Anne Ladegaard Skov (al@kt.dtu.dk), Prof. Ole Hassager (oh@kt.dtu.dk)

The objective of this PhD project is to understand the exact role of molecular parameters such as entanglements, dangling ends and chain architectures on the dynamics of Double Dynamics Networks (DDNs). The project will focus on studying the nonlinear extensional rheology of different DDNs. In order to relate the rheological results to mechanical properties towards applications, the fracture behavior of DDNs in tensile mode will also be investigated.

Responsibilities and tasks:

- Study the nonlinear extensional behavior of the model DDNs as a function of their composition. Nonlinear rheological measurements will be performed under controlled uniaxial extension by using the state-of-the-art filament stretching rheometer (FSR) at DTU.
- Relate the nonlinear extensional properties to nonlinear shear behavior (in collaboration with FORTH).
- Extract the main structure parameters which influence their extensional properties (in collaboration with University of Naples)
- Investigate the strain hardening properties and fracture mechanisms under elongation. Fracture will be investigated by coupling the FSR with a high-speed camera at DTU.
- Relate the strain hardening and fracture to their mechanical properties (in collaboration with ESPCI).
- Relate the extensional properties to the application of adhesion (in collaboration with TESA, where an industrial secondment is planned).

Qualifications: Candidates should have a master's degree in material science, physics, or engineering or a similar degree with an academic level equivalent to the master's degree in engineering. Experimental experience of polymer rheology is an advantage.

Approval and Enrollment: The scholarships for the PhD degree are subject to academic approval, and the candidates will be enrolled in one of the general degree programmes of DTU. For information about the general requirements for enrolment and the general planning of the scholarship studies, please see the DTU PhD Guide.

We offer an interesting and challenging job in an international environment focusing on education, research, scientific advice and innovation, which contribute to enhancing the economy and improving social welfare. We strive for academic excellence, collegial respect and freedom tempered by responsibility. The Technical University of Denmark (DTU) is a leading technical university in northern Europe and benchmarks with the best universities in the world.

ESR7: Opening for an experimental PhD position “Elasto-capillarity in associative polymer networks”

Location: CNRS & University of Montpellier, France

Supervisors: Christian Ligoure (Christian.ligoure@umontpellier.fr), and Laurence Ramos (Laurence.ramos@umontpellier.fr).

The goal of this project is to understand and rationalize how relaxation dynamics in transient polymer networks impact elasto-capillary effects. Elasto-capillarity, which involves a competition between the bulk elastic strain energy and the surface energy, is relevant at macroscopic scales only for ultra-soft solids (with Young modulus < 100 Pa) and dramatically affects the shape, dynamics and failure of a soft solid material. We will experimentally investigate single dynamics polymer networks (SDN) and double dynamics polymer networks (DDN). We expect drastically different and original behavior for DDNs, which should strongly vary with the lifetime and/or elastic modulus of each constituting network.

Several experimental approaches will be developed to investigate those effects, including the impact of a drop of SDN and DDN on a solid surface, the suction and indentation of SDN and DDN, and the frequency-dependent elasticity of a solid with SDN and DDN inclusions.

The successful candidate will have a good background in soft matter physics or material science. Salary and benefits will be according to the EU rules.

ESR 8: Deformability and fracture mechanisms in reversible covalent DDNs

Location: IESL – FORTH, Heraklion, Crete, Greece

Supervisor: Dimitris Vlassopoulos (dvlasso@iesl.forth.gr).

Systematic study of the nonlinear shear rheology of specially synthesized reversible covalent double dynamics networks having different characteristics. It involves using special tools developed in-house. A combination with selective dynamic light scattering and in-situ light or neutron scattering (in facilities) is planned. Linking rheological instabilities with visual observations of the sample and velocity profiles (relevant setups to be developed) will provide insights. Close interaction (and joint experiments via exchange visits) with ESPCI (e.g., velocity measurements, fracture), CNRS (e.g., fracture) and DTU (e.g., extensional rheology) are foreseen. Data analysis and model development/manipulation is also planned.

Target at end of PhD: skills toward molecular design of complex soft materials with desired properties, molecular rheology, rheo-physics, soft matter physics.

A solid background in thermodynamics and transport phenomena is desired. Acquaintance with rheology and/or light scattering is a plus. Hence, a degree in chemical engineering or physics or materials science seems appropriate albeit not mandatory.

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ESR 9: Influence of the composition on the mechanical properties of thermoplastic DD elastomers

Location: DSM, Geleen, The Netherlands

Supervisors: Michelle Seitz (Michelle.Seitz@dsm.com), Evelyne van Ruymbeke (evelyne.vanruymbeke@uclouvain.be)

In this project, the student will begin by exploring structure-mechanical property relationships for a model class of semi-crystalline TPEs by systematically varying parameters (e.g. molecular weight, hardblock length and distribution, and entanglement density) and conducting well-defined mechanical experiments as a function of temperature or rate. Based on this understanding of mechanisms for TPEs, the student will explore to what extent adding additional dynamics (e.g. combination of types of physical crosslinks, covalent bonds, or via crystal morphology) can improve these key mechanical properties. In the second part of the PhD project, the student will utilize the experience gained by studying the model system(s) to contribute to characterizing the complex response of the dual dynamic network systems that are developed within context of the grant's academic network and to translate these concepts into industrial practice. A combination of mechanical testing and structural analysis is foreseen as well as a connection to polymer physics – emphasis will be on generating wholistic, mechanistic understanding of the experimental observations.

The candidature **must have a solid background in materials science and affinity for experimental work** with a strong link towards mechanistic understanding (previous degrees could be in mechanical or chemical engineering, applied physics, polymer physics or chemistry, or materials science).

The student will be located for the first three years at DSM's Material Science Center, the shared research unit of > 300 people support the Materials Science Cluster within Royal DSM with expertises ranging from chemistry, process technology, characterization, and engineering and physics. This in-depth exposure to high level research in an industrial, application driven environment coupled to the full DoDyNet academic network and the final year at the Université catholique de Louvain offers a unique training opportunity spanning industry and academia.

ESR10: Structure and diffusion in DDNs at the nano- to micro- scale

Location: Johannes Gutenberg-University Mainz, Germany

Supervisor: Prof. Dr. Sebastian Seiffert (sebastian.seiffert@uni-mainz.de)

The principal motivation of the DoDyNet European research initiative is to study and develop double-dynamic networks with outstanding mechanical properties. These properties, in turn, are coupled to the polymer-network topologies and architectures, which therefore mandates these to be characterized on two length scales: that of the network mesh sizes on scales of 1–10 nm, and that of topological inhomogeneities on scales of 10–1000 nm. In this workpackage, these nano- to microstructures shall be assessed by mutually synergistic use of scattering and fluorescence-microscopy techniques, encompassing static and dynamic light scattering, partially supplemented by small angle neutron and x-ray scattering, as well as confocal-microscopy based fluorescence correlation spectroscopy and fluorescence photo-bleaching recovery.

Expertise required by the candidate: Master degree in chemistry, physics, or polymer science, with a special strength in physical chemistry; Experimental experience with polymer sample preparation and methodology such as light scattering and optical spectroscopies, ideally fluorescence spectroscopy

Benefits for the candidate other than Marie Curie compensation: Potential enrollment into the Mainz Graduate School of Excellence “Materials Science in Mainz”

ESR11: Modeling the nonlinear rheology of reversible double dynamics networks

Location: UN, Napoli, Italy

Supervisor: G. Ianniruberto (iannirub@unina.it)

The research project aims at understanding the molecular origin of the nonlinear shear and extensional behavior of the double dynamics networks by rationalizing the influence of structure parameters on nonlinear dynamics. The work will consist in extending successful kinetic models for simple networks and/or entangled polymers to double networks. The approach will be twofold, encompassing both molecularly-based constitutive equations and stochastic mesoscopic simulations, coarse-grained to the level of the smaller mesh size of the double network. Though combining ingredients of supramolecular systems with entanglement effects, constitutive equations should be simple enough for possible use in numerical codes for processing simulations. As regards simulations, entanglements will be represented as slip-links joining chains in pairs and through which chains slide in their longitudinal motion (reptation). Molecular models should account for several nonlinear effects: (i) chain stretch, possibly reducing the lifetime of transient bonds, (ii) non-Gaussian effects, determining strain hardening behavior, (iii) separation of chain stretch from chain orientation due to topological constraints (typically observed in entangled systems, while normally ignored in models of crosslinked networks).

Candidates with a background in chemical engineering, materials science or physics are encouraged to apply. Good background in modeling is also a plus. The student will have access to the PhD program at UN, and hence he is expected to get the PhD degree at UN.

ESR12: Modeling the linear rheology of reversible Double Dynamics Networks

Location: UCL, Louvain-La-Neuve, Belgium

Supervisor: E. van Ruymbeke (evelyne.vanruymbeke@uclouvain.be)

The objective of this PhD project is to develop a model based on the tube theory as well as on the existing network theories, in order to describe the viscoelastic response of the supramolecular networks which combine entanglements and supramolecular dynamics. This project can be seen as the continuation of our present work on modelling the rheological behavior of end-functionalized entangled polymers.

Candidates should have a master's degree in material science, physics, or engineering. The applicant should have a good expertise in modeling as well as a good background in polymer physics.

ESR13: Application properties of double dynamics polymer networks

Location: ESPCI, Paris, France

Supervisor: C. Creton (Costantino.Creton@espci.fr)

The project will focus on the application (tensile and adhesive) properties of Double Dynamics Networks, and relate these properties to their rheological/mechanical response.

The applicant **must have a solid background in materials science and affinity for experimental work** with a strong link towards mechanistic understanding (previous degrees could be in mechanical or chemical engineering, applied physics, polymer physics or chemistry, or materials science).

Appendix 4 : PCDP sent to ESR – Assessment Year 1

Career Development Plan

Guidance on some of the competencies expected

The career development plan is divided into 3 parts. The first part (Year 1) should be completed soon after starting the position. The second part (mid-term) should be completed half way through your project. The final part (final year) should be completed near the start of your final year on the project.

Each part should be sent to the Executive Committee for approval.

The following points are a non-exhaustive series of aspects that could be covered by the career development plan, and it is relevant to the short-term objectives that will be set by the researcher and the reviewer at the beginning of the fellowship period. The objectives should be set with respect to the skills and experience that each researcher should acquire at a given time of his/her career. A postgraduate researcher at PhD level will have very different needs compared to a post-doctoral researcher at an advanced stage of his/her professional development. These objectives should be revised at the end of the fellowship and should be used as a pro-active monitoring of progress in the researcher's career.

RESEARCH RESULTS.

These should give an overview of the main direct results obtained as a consequence of the research carried out during the training period. It may include publications, conference, workshop attendance, courses, and /or seminar presentations, patents etc. This will vary according to the area of research and the type of results most common to each field. The information at this level should be relatively general since the career development plan does not strictly constitute a report on the scientific results achieved.

RESEARCH SKILLS AND TECHNIQUES ACQUIRED.

Competence in experimental design, quantitative and qualitative methods, relevant research methodologies, data capture, statistics, analytical skills.

Original, independent and critical thinking.

Critical analysis and evaluation of one's findings and those of others

Acquisition of new expertise in areas and techniques related to the researcher's field and adequate understanding their appropriate application

Foresight and technology transfer, grasp of ethics and appreciation of IPPR.

RESEARCH MANAGEMENT.

Ability to successfully identify and secure possible sources of funding for personal and team research as appropriate.

Project management skills relating to proposals and tenders work programming, supervision, deadlines and delivery, negotiation with funders, financial planning, and resource management.

Skills appropriate to working with others and in teams and in teambuilding.

TRANSFERABLE SKILLS.

Personal presentation skills, poster presentations, skills in writing reports and preparing academic papers and books.

To be able to defend research outcomes at seminars, conferences, etc.

Contribute to promote public understanding of one's own field (presentations at open days / schools / other public events, production of dissemination materials).

Other skills such as language skills, teamwork, project management, event organisation

OTHER PROFESSIONAL TRAINING (COURSE WORK, TEACHING ACTIVITY):

Involvement in teaching, supervision or mentoring

ANTICIPATED NETWORKING OPPORTUNITIES.

Develop/maintain co-operative networks and working relationships as appropriate with supervisor/peers/colleagues within the institution and the wider research community. Include details of industrial secondments, visits to other institutions.

OTHER ACTIVITIES (COMMUNITY, ETC) WITH PROFESSIONAL RELEVANCE.

Issues related with career management, management of own career progression, ways to develop employability, awareness of what potential employers are looking for when considering CV applications etc.

Career Development Plan Year 1

Name of fellow:

Department:

Institution:

Name of Supervisor:

Please read the notes at the beginning of this document for guidelines on how to complete each section.

BRIEF OVERVIEW OF RESEARCH PROJECT

1. Brief overview of Research Project, and major accomplishments/outcomes expected:
2. Milestones, deliverables, other reports linked to this project (include expected date of delivery):

LONG-TERM CAREER OBJECTIVES (OVER 4 YEARS)

1. Goals:

2. What further research activity or other training is needed to attain these goals?

SHORT-TERM OBJECTIVES (1-2 YEARS)

1. Research results (*optional for ESRs*)
 - Anticipated publications:

 - Anticipated conference, workshop attendance, courses, and /or seminar presentations:

2. Research Skills and techniques:
 - Desired training in specific new areas, or technical expertise etc:

3. Desired transferable skills:
 - Communication skills:

 - Other skills:

4. Other professional training anticipated (e.g., teaching activity):

5. Anticipated networking opportunities:

6. Grant management: *(optional for ESRs)*
 - Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)

7. **ECTS/other university requirements:** List of identified courses / training events / activities that will contribute to any university requirements (such as ECTS credits. *This will differ from institution to institution. Please also indicate what requirements your university has (e.g. no requirements, x number of ECTS credits, x number of courses etc.)*)

Date & Signature of fellows

Date & Signature of supervisor:

Appendix 5: DoDyNet Supervisory Board of the network

Governing board

Coordinator: Prof. E. van Ruymbeke (UCL)

Prof. C. Creton (ESPCI)

Dr Q. Huang (DTU)

Prof. G. Ianniruberto (UN)

Prof. C. Ligoure (CNRS)

Dr. P. Roose (Allnex)

Prof. S. Seiffert (UM)

M. Seitz (DSM)

Prof. D. Vlassopoulos (FORTH)

Executive committee

Dr. Tom Engels (DSM)

Prof. E. van Ruymbeke (UCL)

Prof. D. Vlassopoulos (FORTH)

Specific leaders

Dissemination officer: Prof. L. Ramos (CNRS)

Gender officer: Dr Q. Huang (DTU)

Industrial officer: Prof. P. Steeman (DSM)

Training officer: Prof. G. Ianniruberto (UN)

WP Leaders

WP 0 : Prof. E. van Ruymbeke (UCL)
WP 1: Prof. C.A. Fustin (UCL)
WP 2: Prof. S. Seiffert (UM)
WP 3: Prof. D. Vlassopoulos (FORTH)
WP 4: Prof. E. van Ruymbeke (UCL)
WP 5 : Prof. C. Creton (ESPCI)
WP 6 : Prof. Ianniruberto (UN)
WP 7 : Prof. P. Steeman (DSM)
WP 8 : Prof. L. Ramos (CNRS)

External advisory board

Prof. M. Rubinstein (University of North Carolina)
Prof. R. Colby (Penn State University)
Prof. H. Watanabe (Kyoto Univeristy)
Prof. J. Ping Gong (Hokkaido University)
Prof. I. Voets (Eindhoven University of Technology)
Prof. Z. Wang (University of Reading)
Prof. D. Read (University of Leeds)
Prof. B. Olsen (MIT)

Appendix 6: Minutes of the Governing Board Meeting, FORTH, September 2018

Venue : Seminar room 2, ITE, FORTH, Heraklion, Crete

Participants present : Charles-André Fustin, Christine Hambursin, Larissa Hammer, Qian Huang, Giovanni Ianniruberto, Christian Ligoure, Benoît Loppinet, Giuseppe Marrucci, Tetsuharu Narita, Renaud Nicolaÿ, Paola Nicolella, George Petekidis, Laurence Ramos, Patrice Roose, Michelle Seitz, Evelyne van Ruymbeke, Dimitris Vlassopoulos, Stephan Zoellner.

Governing Board Meeting

It was asked that the ESR students choose two Responsible Fellows to represent them in the Governing Board meeting. Larissa Hammer (ESPCI) and Paola Nicolella (UMainz) accepted to be the first to Responsible Fellows.

- **Meetings**

Michelle Seitz started by presenting how the organization of the next meeting was going. She underlined two points: which students would benefit from an Industrial stay and which visiting experts to invite.

For the Industrial workshop, she presented different subjects. All the points would fit in one day. Writing a CV would be a thematic that would be a bit early to present, it might be better to do this during the tesa meeting later. Visiting facilities is logistically difficult so it will be limited to certain areas.

Costantino Creton will organize the Advanced Modules, Tom Engels or Michelle Seitz can talk about different mechanical properties.

The Project Meeting would start with the Project Officer with the assessment

On the Friday, most of the students would present their results.

Who would be the best visiting expert to invite to this meeting?

Ralph Colby will be in Zurich in February so we can ask him. Ilja Voets would be logistically easier, but not ideal with the topic of the meeting but it would be a nice opportunity to meet her. Evelyne van Ruymbeke will contact them both after the meeting to see who is interested.

The budget of the event will depend on how many people will come to stay and how many nights will be booked at the venue.

For the DTU Modules, we could follow a similar structure as the one organized during Supolen. Qian Huang need to let us know if she needs help or if they want someone else to be invited or involved, even if the person is not in the network. The accommodation for this event needs to be studied quite quickly.

- **Regarding the assessment of the Training Modules**

Student assessment depends on who needs to have ECTS for their PhD Students. In UCLouvain, it is sufficient for the ESR to follow the courses. The students from ESPCI Paris, DTU, FORTH, UMontpellier do not need an evaluation either to obtain the ECTS.

The situation needs to be clarified for the University of Naples. During the Supolen project, questions were sent after the Training Modules and the students had to read papers after the meeting. The solution offered is to do a special attendance certificate for the UNaples student which specifies the courses followed during the Modules, the professors teaching and the number of hours per course.

There also needs to be an assessment of the Training Modules by the students. The answers need to be anonymous. It is decided that the questionnaire will be sent to the two Responsible Fellows so they can forward them via the ESR mailing list to the other students. Once they have answered, they will send the questionnaire to the project manager.

The feed-back from the questionnaire will be put on the website.

There is a new questionnaire that has been created for the project (*see Appendix*). The project manager will send it to the Training Officer, once it has been validated by him it will be sent to the students.

- **Visiting experts**

The objective is to invite one visiting expert at each meeting, it is a good way of keeping in contact with them. As Daniel Read is geographically close to the network, we can offer him to come everything time. He is also relevant in terms of content for the subjects which will be addressed in DTU.

For the DSM meeting, we can suggest that the invited visiting expert does a presentation of his/her work or a lecture.

For the meeting in DTU, Zuowei Wang and Daniel Read would be good people to contact as their work is related to extensional rheology.

There is also the possibility for the visiting experts to come during the project to visit the labs. It would be interesting to combine different lab visits successively.

- **Budget**

If the organization of meeting seems to be running over the amount assigned for the meeting, it has to be justified to the Governing Board.

If we can pay expenses directly from UCL, it makes it more easy on the accountant's side.

If the expenses are higher than 8 500€ for one type of expense, then an open market has to be carried out.

We will prepare a form which can be used for different expenses: travelling, sample preparation, etc.

If there is money left at the end of the project, it will be redistributed to the partners.

The Governing Board expenses are usually limited to the dinner related to this meeting. The Mid-Term Review will be put on Management. There is no overhead anymore on expenses.

The accommodation for the academics and students are covered, if there is an external invited guest then it has to be discussed during the Governing Board Meeting.

The use of a per diem following the way we work for this project is questionable as most of the expenses are already covered. This makes the per diem usually to high compared to the real individual cost of participation.

We need to cover the expenses of visiting experts and external people who participate to meetings. If we provide breakfast and lunch, then it is only the evening meal that will need to be reimbursed.

Thus the per diem of 50€ was fixed when only food needs to be payed personally and when accommodation is covered by the organization of the meeting.

- **Questions related to the budget**

If we have external students coming, how do we estimate the cost? It will be calculated on the actual expenses. Notably for Capri which will be advertised to a broader public.

We should start advertising quite soon for the Summer School. We need to do a Mailing list and flyer to advertise it. To do this, we need information on who will be participating. Once we know this, we can send it to the Dissemination Officer, Laurence Ramos. First, we need to advertise to our network as the maximum people registered will be around 80.

- **Gender equality**

How to deal with members who need to travel with their children to attend meetings. It is underlined that it would be preferable to avoid having meetings planned during the week-ends. The only other meeting with a weekend will be Capri as it will be held from the Monday to the Saturday.

How do we determine a limit amount to costs and respect Gender Equality? For this meeting, the cost of travel for the children was covered but nothing else. The people who organize the meeting underline that childcare can be organized but the question of the language would be problematic.

The gender equality measures are relevant for everyone, ESR included.

- **Achieved Deliverables & Milestones**

The deliverables are presented. The next due deliverable is the Yearly ESR Progress Report. The students need to make a small description of what they have done up to now. The period covered is from the start of the project to this date. The template will be made available on the website. An email will also be sent to all the students to give them the information.

Most of the Milestones regard sharing the samples. Members of the network need to inform the Project Manager if they send samples to another partner so that the information can be shared with all the network on the work that is being carried out.



DODYNET

Summer School on transient and complex polymer networks

22 – 27 July 2019, Capri, Italy



Organisers

The DoDyNet Summer School will be held from the 22nd to the 27th of July 2019, on the beautiful island of Capri.

The school aims to explore all aspects of polymer networks containing supramolecular junctions or several dynamics of association.

The school is addressed to students and researchers both from industry and academic institutions, and is open to all with an interest in this field.

Participants will also have an opportunity to present their own work during poster sessions.

The summer school is organized by Prof. Giovanni Ianniruberto, (Dipartimento di Ingegneria chimica, dei Materiali e della Produzione industriale, Università Degli Studi di Napoli Federico II) and Prof. Evelyne van Ruymbeke (Bio- and Soft-Matter, Université catholique de Louvain). This project has received funding from the European Union as an Innovative Training Networks under the H2020 Marie Curie Actions programme.

Confirmed Invited Speakers

- Ralph Colby (Penn State University)
- Salvatore Coppola (Versalis, Italy)
- Emanuela Del Gado (Georgetown University, USA)
- Emmanouela Filippidi (University of California, USA)
- Jian Ping Gong (Hokkaido University, Japan)
- Giuseppe Marrucci (Naples University, Italy)
- Yuichi Masubuchi (Nagoya University, Japan)
- Bradley Olson (MIT, USA)
- Daniel Read (University of Leeds, United Kingdom)
- Michael Rubinstein (University of North Carolina, USA)
- Ilja Voets (Eindhoven University of Technology, The Netherlands)
- Zuowei Wang (University of Reading, United Kingdom)
- Hiroshi Watanabe (Kyoto University)

Registration fee

- 300€, this includes all course materials, coffee breaks and lunches, as well as a social dinner
- Note that places are limited, so please register early
- Registration at <https://www.dodynet.eu/capri-summer-school-july-2019/registration/>
- Deadline for registration: 28 March 2019

*Appendix 8 : Newsletter following the first project meeting in September 2019,
FORTH, Heraklion, Crete*

Newsletter Intermediate Meeting Heraklion 2018



DoDyNet

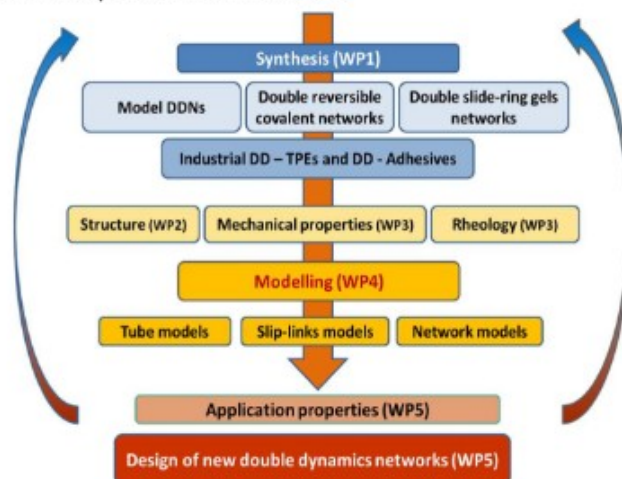
DoDyNet INITIAL TRAINING NETWORK

01.



**Innovative Training Network (ITN)
Marie-Curie Actions**

This September, the DoDyNet group had their first intermediate meeting. This meeting took place over the course of a week in Heraklion, Greece. First the project served as a way of introducing members to the entire network. Industrial partners Allnex (Belgium), DSM (The Netherlands) and tesa (Germany) were represented by Patrice Roose, Michelle Seitz and Stephan Zoellner respectively. This was followed by a series of lectures from participating professors as well as visiting experts Giuseppe Marucci (UNaples) on generalities of networks, Daniel Reed (ULeeds) on polymer physics and Emanuela del Gado (Georgetown University) on the microscopic dynamics and rheology of soft gels. As the Early Stage Researchers (ESR) come from varying scientific backgrounds, the objective of these lectures was to ensure that everyone starts with a basic understanding of each part of the network.



This is how Dodynet works: Samples synthesised in one work package (WP1) are characterised for structure, rheological and mechanical properties in another (WP2 and WP3) and then modelled (WP4) at the same time with continual feedback between each group to advance the research.

FORTH OVERVIEW



The Foundation for Research and Technology - Hellas (FORTH)

It was established in 1983, is one of the largest research centers in Greece. They are active in fields as varied as electronics, molecular biology and cultural studies and promote scientific progress through collaboration with international partners and high quality research.



The Institute of Electronic Structure and Laser (IESL) was one of the three initial institutes founded in 1983. It has since established its international presence in the areas of Laser Science, Micro/nano-electronics, Polymer Science, Materials Science and Astrophysics.



The Polymer and Colloid Science group focuses on the rheology and dynamics of model polymer and colloidal systems with expertise in scattering techniques (dynamic, neutron, X-ray).



This is the lab where ESR Consiglia Carillo and Christina Pyromali work with Prof. Dimitris Vlassopoulos.

TEAM PRESENTATION

**Clément
Coutouly**

Clément Coutouly
ESR 1, works on the synthesis and dynamics of model supramolecular polymer networks at Université catholique de Louvain in Belgium under the supervision of Prof. Charles-André Fustin and Prof. Evelyne Van Ruymbeke.

**Rowanne
Lyons**

Rowanne Lyons
ESR 2, works on the synthesis and rheological analysis of double dynamic networks based on slide ring gels at the Université catholique de Louvain in Belgium under the supervision of Prof. Charles-André Fustin and Prof. Evelyne Van Ruymbeke.

**Larissa
Hammer**

ESR 3, works on the design and synthesis of double dynamic networks based on reversible covalent bonds at ESPCI Paris, France under the supervision of Renaud Nicolaÿ.

**Stefania
Traettino**

ESR 4, works on "supramolecular double-networks based on microgels with reversible covalent interactions" at Laboratoire Matière Molle et Chimie, ESPCI Paris, under the supervision of professor Michel Cloitre.

**Christina
Pyromali**

ESR 5, studies the linear and non-linear viscoelastic response of double dynamics networks under large shear deformation at FORTH, Greece, under the supervision of Dimitris Vlassopoulos.

Wendi Wang

ESR 6, studies viscoelastic response of double dynamics networks under transient elongation at Danmarks Tekniske Universitet (DTU) in Denmark under the supervision of Qian Huang, Ole Hassager and Anne Ladegaard Skov.

**Carole-Ann
Charles**

ESR 7, studies the elastocapillary effects on double dynamics networks at Laboratoires Charles Coulomb in Montpellier, France, under the supervision of Christian Ligoure and Laurence Ramos.

04.

TEAM PRESENTATION

**Consiglia
Carillo**

ESR 8, studies the deformability and fracture mechanisms in reversible covalent DDNs at FORTH in Heraklion under the supervision of Dimitris Vlassopoulos.

**Simone
Sbrescia**

ESR 9, studies the influence of temperature and composition on mechanical properties of DD-Thermoplastic Elastomers at DSM in The Netherlands under the supervision of Michelle Seitz and Tom Engels, officially enrolled at UCL in Louvain-la-Neuve with Evelyne van Ruymbeke as supervisor.

**Paola
Nicoletta**

ESR 10, studies the structure and diffusion in DDNs at the nano- to micro- scale at Johannes Gutenberg-University Mainz in Germany (Department of Physical Chemistry) under the supervision of Prof. Dr. Sebastian Seiffert.

Hongwei Liu

ESR 11, studies the nonlinear rheology of reversible double dynamics networks at Università degli Studi di Napoli Federico II in Napoli, Italy, under the supervision of Giovanni Ianniruberto

Yanzhao Li

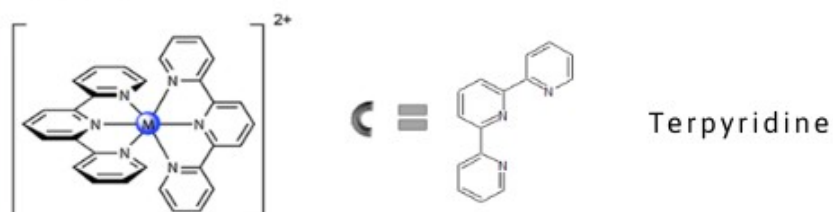
ESR12, modelling the linear dynamics of double dynamics polymer networks at Université catholique de Louvain in Louvain-la-Neuve, Belgium under the supervision of Evelyne Van Ruymbeke.

Jianzhu Ju

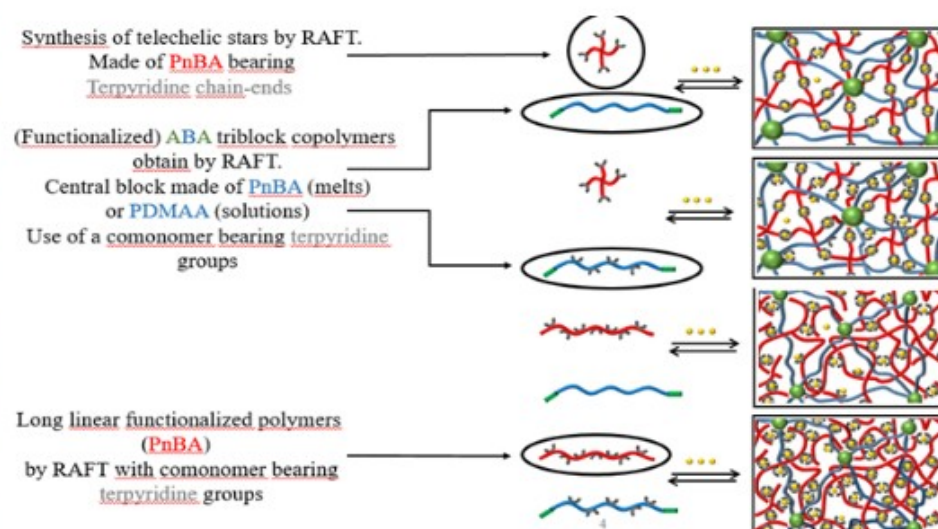
ESR 13, studies the application property of double dynamics networks at Laboratory of Soft Matter Science and Engineering in ESPCI, Paris, France, supervised by Costantino Creton and Tetsuharu Narita.

At this stage, many ESRs are at the beginning of their research. Nevertheless, the earliest researchers recruited, Carole Ann and Clément have already made great progress:

Clément Coutouly, ESR 1, UCLouvain, has been working on the synthesis of model double dynamic networks based on metal-ligand interactions. Terpyridine ligands and divalent metal ions form stable complexes:



The goal is to develop durable double network gels with strong mechanical properties, which can be achieved in three ways:



The synthesis of long chain ABA triblock copolymers has been achieved with poly n-butylacrylate (PnBA) and polystyrene (PS) in the melt state. The amount of PS was varied from 2-5%, with a turbid aspect observed at 5% PS.



PS 3%



PS 5%



EXPERIMENTS

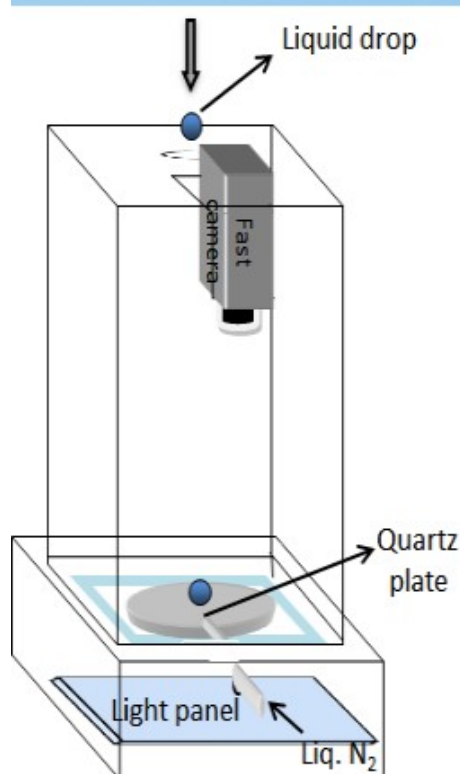
These copolymers were also successfully functionalized with 0.5% of terpyridine.



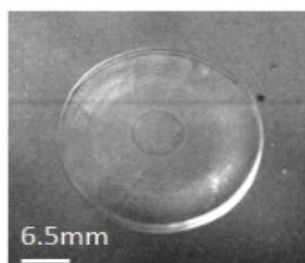
The next steps include increasing the percentage of terpyridine ligands to 2% and investigating the possible phase separation that may be occurring at higher PS levels. A total of 11 samples were immediately available for Dodynet members. Bravo Clément!

Carole-Ann Charles, ESR 7, Laboratoire Charles Coulomb, has been working on improving and characterizing a setup allowing the study of drop impact dynamic with minimized shear dissipation. This setup uses the inverse of Leidenfrost effect by performing the impact on a thin layer of liquid nitrogen that evaporates when the drop at ambient temperature comes into contact with it, forming a vapor cushion on which the drop can expand radially freed from shear dissipation.

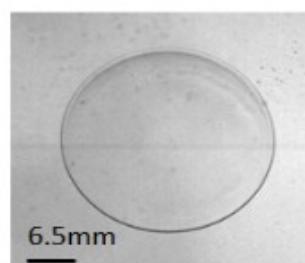
By changing the surface of impact from a silicon wafer to a quartz plate, a semi-automatic analysis of the data is now possible and a study of the sheet thickness field is conceivable thanks to the better contrast.



Before

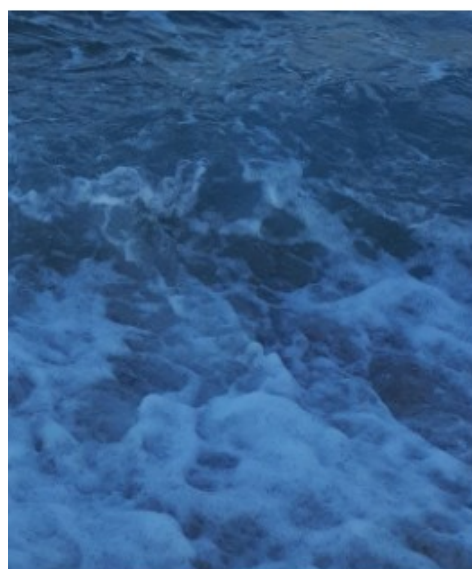


After



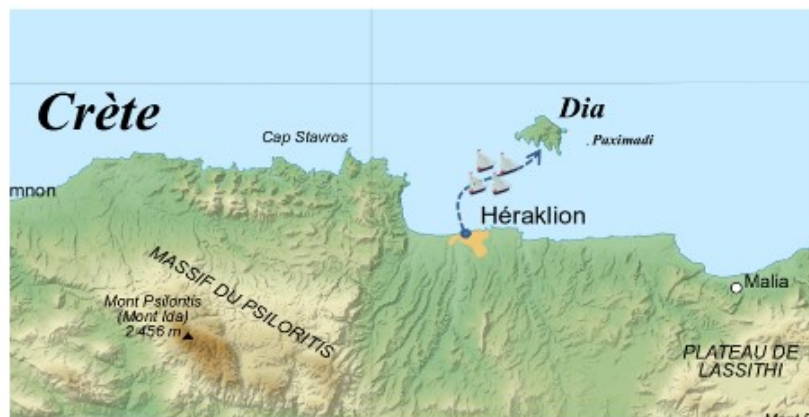
S. Arora et al., 2017

Subsequently this setup will be used to study the impact of double dynamic networks and will allow to rationalize the different roles of inertia, elasticity, capillarity and dissipation.

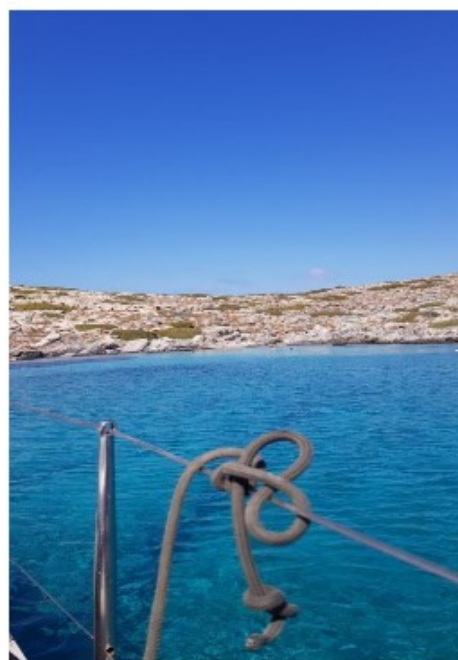




Of course in such a beautiful setting, we did not spend all our time in the laboratory! On Sunday 23rd, we sailed up to Dia, an island 7 miles north of Crete with a rich history.



According to mythology, after the people of Crete angered Zeus, he created a giant sea monster to destroy them but was persuaded to change his mind and he petrified it instead. This might explain why it's still uninhabited...



Both professors and students enjoyed a peaceful day of sunbathing and swimming on this beautiful island without an incident to declare during the outing!

08.



Next Meeting : DSM 2019

As a European Union funded initiative, one of the goals is to maximise collaboration between partner universities and industrial partners. This will be achieved through periodic internships for each ESR as well as regular meetings with all members.

The next meeting will be organized by DSM in the Netherlands from the 29th January – 2nd February 2019.

See you then!

The DoDyNet Summer School
22 - 27 July 2019
Capri

The school is addressed to students and researchers both from industry and academic institutions.

Confirmed invited speakers :

Ralph Colby (Penn State University)
Emanuela Del Gado (Georgetown University, USA)
Jian Ping Gong (Hokkaido University, Japan)
Giuseppe Marrucci (Naples University, Italy)
Daniel Read (University of Leeds, United Kingdom)
Michael Rubinstein (University of North Carolina, USA)
Ilja Voets (Eindhoven University of Technology, The Netherlands)
Zuowei Wang (University of Reading, United Kingdom)
Hiroshi Watanabe (Kyoto University)

The DoDyNet Team



www.dodynet.eu